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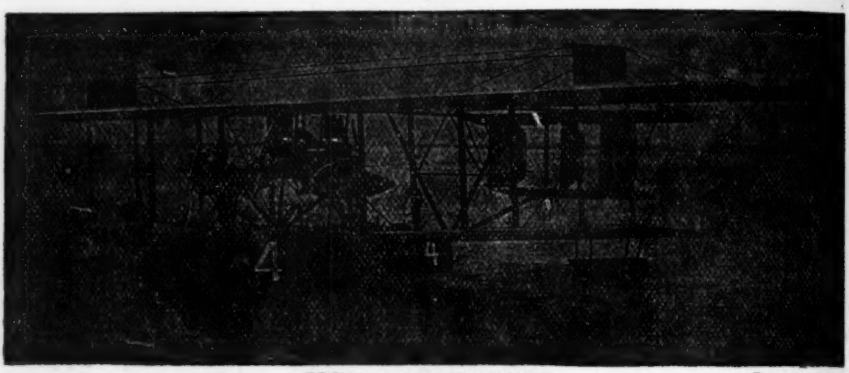

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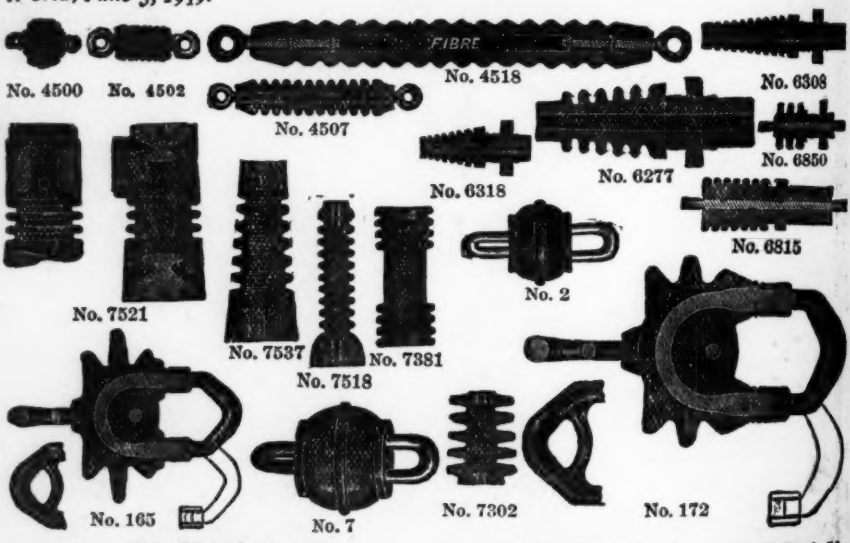

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Proceedings

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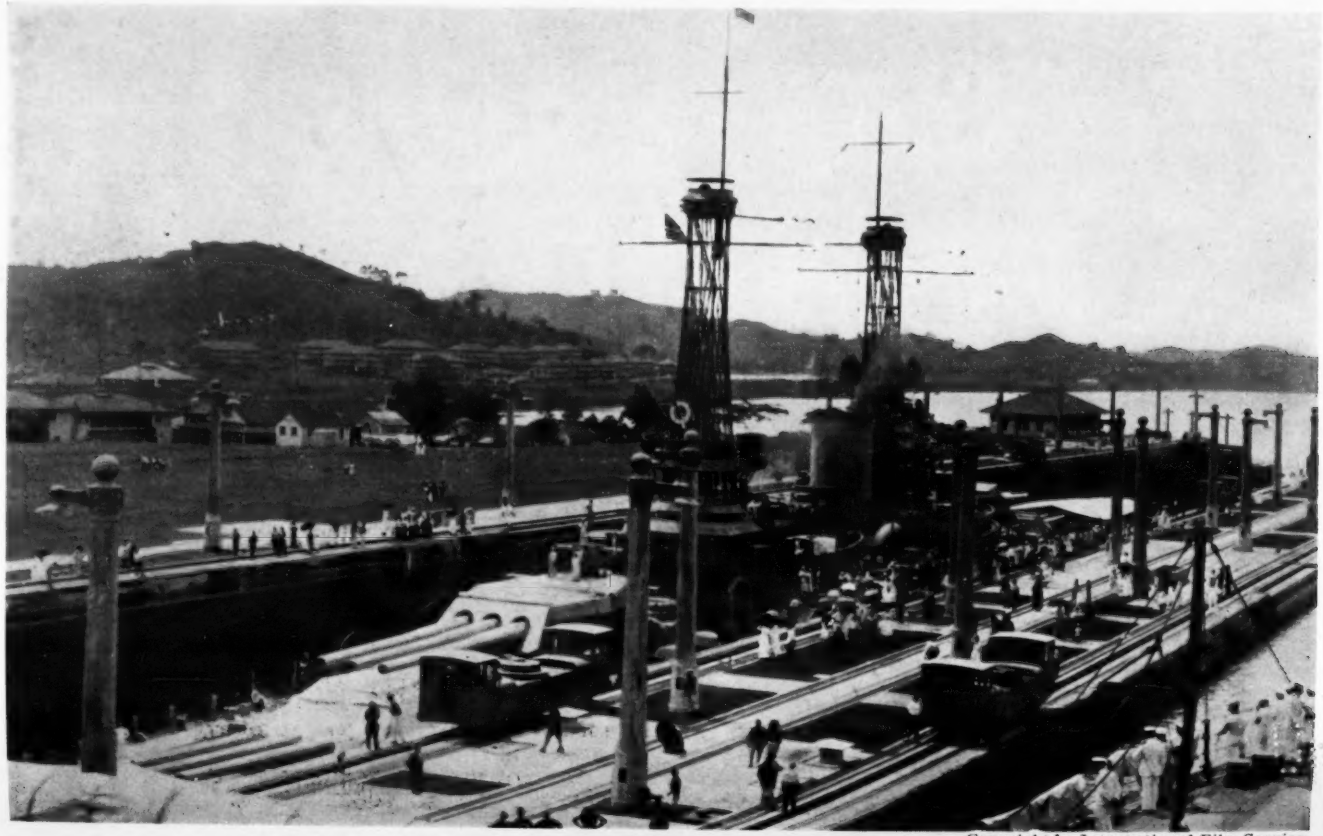

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

PROMOTION AND NATURAL SELECTION

By Lieut. Commander F. S. Craven, U. S. Navy

I

It is necessary to have a clear understanding of the duties and functions of the commissioned personnel of the navy in order to form an intelligent opinion on promotion. These functions have been undergoing steady alteration in keeping with the rapid development of mechanical devices in all branches of the naval service. It is proposed to discuss generally the functions of the commissioned personnel which result from modern conditions, in order to establish the basis for the system of promotion and selection advocated in this article.

The United States Navy, built upon the principle that the best defence lies in a vigorous offensive, is, therefore, an offensive military organization. The personnel for such an organization should primarily be fighters, but the commissioned personnel necessarily have other duties as well. A most important duty—an *essential* duty—is to perfect the organization and the matériel so that the navy will be prepared to fight successfully when war comes.

A navy, much more than an army, is an organization of slow development. Years are required to design and build a battleship, and months are required to train a recruit to be of material value as a member of its crew. A vital mistake in design, once incorporated into the fabric of a ship, can seldom be corrected, and, because of the cost and time involved, the defective ship cannot be discarded, but must be employed as a unit of the fleet.

A nation exists many years in peace for each year of actual warfare, yet naval development is constantly progressive. Nations sufficiently powerful to require navies cannot afford to possess equipment or to employ methods which are known to be inferior to those of the navies of other nations. Excellence of design and construction of equipment, if arrived at by efficient processes and if based on correct principles, will tend toward economy in cost as well as effectiveness in use if operated by a well-instructed and well-disciplined personnel.

It should be obvious without further discussion that a navy must have exceptionally able leaders and designers, and that the difficulties which beset the paths of these men may well be greatest during times of peace. Then the task of preparing the navy for war must be undertaken without the advantage of the experience of constant warfare. The advances of science and invention tend to render obscure the proper applications of the lessons of past wars, and this condition increases from year to year, so that, after a long period of peace, a navy can only be prepared for war if it has progressed under the guidance of leaders of exceptional originality, mentality, analytic ability, and judgment.

But the load does not fall entirely on the leaders. With the extended use of complicated electrical and mechanical equipment, tending more and more toward automatic control, the demands on the intelligence and training of the operative personnel increase enormously. The desire may exist to avoid the use of such devices, but the impossibility of permitting their use by other navies, without having something else to offset the advantages which they undeniably confer, forces their adoption. Consider, for example, the submarine, the torpedo, director firing, "follow the pointer" systems. To train the operative personnel in the use and upkeep of these devices there must be a great body of sea-going line officers possessing in well-balanced quantities the essentials of intelligence, energy, good judgment, and loyalty to the ideals of the naval profession. The quality of courage can almost be assumed for men of this type, together with determination and perseverance necessary to make them fighters.

In addition to the leaders proper and the sea-going line officers, there must also exist an appreciable number of junior officers of the line who must exercise administrative, executive, and technical

duties. These men are the assistants of the leaders. They must be equipped in marked degree for their jobs; in short, they must be "specialists," applying their energies along single lines, both ashore and afloat, in order that they may gain the necessary knowledge and experience to ensure the highest order of expertness. Men of this type will be required for all branches of the administrative divisions of the navy, including military operations, war planning, the determination of the characteristics of the fleet, strategy and tactics, fire control and gunnery, and the essentially professional technical lines. It is one of the essentials of good leadership to select and train good assistants, and the younger officers who will comprise this class will naturally have been selected by the leaders, either directly, or through the agency of a scientifically worked out plan for the study and codification of the characteristics of the younger officers of the navy.

It should here be remarked that line officers of the navy should not be expected to perform the functions of purely engineering specialists. Neither their education nor their experience fits them for such work, and, furthermore, engineering skill of the highest order, along highly specialized lines, can readily be obtained from civil life. The technical experts among the line officers should be developed along broad engineering lines supplemented by training and experience in narrow professional specialties, so that they may be fitted to coordinate and direct the activities of the civilian engineering experts. Specialization of this character will not result in unfitting a man for purely military or administrative work later on, because a proportion of sea service (though applied along his specialty) will be required to keep him in touch with conditions afloat. It is not improper to remark that the specialization described above is not what we have had so far in the navy. Civilian engineering talent of the first water is rarely to be found in the employ of the Navy Department, and the inconsistent assignment to duty of the officers who have received post-graduate engineering training does not fit them to take the places of such talent.

II

The problem for promotion is to secure for the navy the best available leaders, to select and develop capable assistants for them, and to maintain the standard of efficiency of the great body of the

operative personnel at the highest possible level—employing processes which will effectually safeguard the rights of the individual.

Such leaders can only be obtained by a process of "Selection Up" from among those officers who have demonstrated their capacity for leadership. The technical and professional specialists—the assistants for the leaders—should be sought out as early as possible in their careers and given special training, employing a method which will effectively comb out the entire available material. The efficiency of the operative body of the commissioned personnel must be maintained by a process of elimination of those who are found to be physically, mentally, morally, or temperamentally unfit. This process has been heretofore generally known as "Selection Out."

The process of Selecting Up the leaders will automatically provide a field for Selection Out because there will be created a certain number of officers who have been passed over, many of whom will lose interest or become discontented. The existence, between the middle grades and the leaders, of such a stratum cannot be tolerated, and as the existence of discontent or loss of interest might not become apparent to the Department in the cases of certain individuals, permitting them to instill some of their spirit into their juniors, it is obviously advisable to Select Out all officers who can be included within this category. The resultant stimulation of promotion would in itself be beneficial. There would be some of these officers who would be good men, though of too unimaginative or unprogressive types to make leaders, who would welcome active service on the retired list, particularly if active service pay is assured and if there is prospect of promotion on the retired list. Such men could advantageously be employed in the many semi-professional and non-professional duties which come under the Navy Department, releasing for more active work officers of more progressive types, provided such employment on active service be desired by the individual concerned.

The application of Selection Out to the junior grades is not so obvious. It can only be accomplished by careful study and tabulation of the various attributes of the younger officers, facilitated by the plastic state of their character development. After character development has reached the hardening stage, at which men are said to "find themselves," such selection out becomes both

difficult and of doubtful correctness, whereas prior to that stage there should be but a small proportion of error. It is not proposed, therefore, to attempt selection out in the middle grades, but rather to permit this portion of the personnel, having survived the pruning, to progress smoothly along the path of promotion by seniority, with ample opportunity for the undisturbed development and *demonstration* of the qualities of leadership.

There may now be laid down a concrete plan for promotion and selection in the line of the navy, based on the application of what really are the laws of nature:

Selection Out:

1. By physical and mental examinations for entrance to the Naval Academy, essentially as at present.
2. By psychological, physical, and mental tests applied during the course at the Naval Academy.
3. By modified forms of similar tests applied to the young officers in the grades of ensign, lieutenant, junior grade, and lieutenant.
4. By automatic retirement of commanders and captains who fail to achieve Selection Up, with certain reservations explained later.

Special Selection:

1. In the grades of lieutenant and lieutenant, junior grade, for technical specialties, including ordnance design, engineering design, electrical design, naval construction, and shop management.
2. In the grades of lieutenant commander and lieutenant for professional specialties, including gunnery, fire control, torpedo control, communications, tactics, and the like.
3. From captains and flag officers for high administrative positions in the department and for command afloat, essentially as at present.

Selection Up:

1. From commander to captain.
2. From captain to flag rank.

III

The processes for Selection Out in the lower grades and for special selection for training are practically identical, because in

order to identify those young officers who possess indifferent or undesirable characteristics it is necessary to utilize a system which will examine into and record all the characteristics of all young officers. This will automatically indicate the special aptitudes of each, and will further indicate those possessed of unusual abilities.

Referring to the outline at the end of the preceding section of the article, it will be noted, under the head of "Selection Out," that there is no mention of a psychological test in the requirements for admission to the Naval Academy. This is because it is not believed that a just and conclusive test can be applied within a few hours to a young man who knows that it is in progress. Immaturity would cause the rejection of many who later would have developed splendid qualities; and it would prove a simple matter to prepare ("cram") candidates for this test in the same way they are now prepared for the mental examinations, thus defeating the purpose of the test. However, once a candidate has passed into the Academy he can and should be subjected to a scientifically arranged series of tests carried out during the entire course of four years which will develop and reveal his attributes along the elementary lines of courage, aggressiveness, initiative, will power, reliability, perseverance, deductive ability, the ability to act and think quickly, and the like. All of these are not usually marked in the character of one individual, and it is the peculiar arrangement of them in a character which fits the individual for this or for that special field of endeavor. The early recognition of such predispositions will save much wasted effort and will permit their direction along lines which will benefit both the navy and the individual.

While psychology is not an exact science, it is sufficiently so to permit the development of these tests so that there will be a very small proportion of error in their indications. Among the means available for the application of the tests are athletics, assignments to unpleasant or tedious duties, unexpected elevation to positions of unguided responsibility, unexpected delegation of authority, and withdrawal of assistance after the individual has been embarked on a definite line of original work. Needless to say, the application of these tests must be covered by a carefully worked out scheme of observation and record prepared by officers who have themselves been specially selected for their fitness for

the work, under the direction of psychologists of recognized ability. They should be applied without the conscious realization of the subjects of the tests.

After graduation the tests could not be applied in exactly the same manner, but their general character would be about the same. The regular activities of the service would provide a series of tests of which the young officer would be quite unconscious. Observation of his performance of duty and frequent report thereon by *all* his immediate superior officers would prove the means of determining his qualifications.

Of course this is practically our present method of grading by means of fitness reports. However, the present form of report should be revised under the direction of the psychologists referred to previously, in order to eliminate the following faults:

1. The marks assigned in the present reports do not afford a good basis for comparing officers because no two reporting seniors mark on exactly the same basis, and because many officers mark too leniently.

2. The present reports do not indicate reliably which of two men is the better officer, nor which of an individual's various good points is his best.

3. The present form of report produces a tendency on the part of the reporting senior to confuse zeal with ability. For example, few commanding officers will assign a low mark in engineering to an engineer officer who works very hard, but whose real abilities do not at all lie in that line.

It is not proposed to offer detailed suggestions for the form in which the present report should be revised, but the following general suggestions are offered:

(a) Divide the report very clearly into two sections in order to separate zeal from ability.

(b) Each section should be in the nature of a questionnaire in order to bring all sides of the matter to the attention of the reporting officer. By this method comments will be invited on points which might escape the memory or attention.

(c) The first part of the report, to bring out zeal, should contain references to all the essential or desirable characteristics such as energy, thoroughness, conscientiousness, carefulness, and resourcefulness, and a mark—or rather, re-

mark—should be required on each, restricted to one of the following:

Excellent,
Very Good,
Good,
Fair,
Indifferent,
Poor.

(d) The second part of the report should consist of a list of specific abilities, such as military command, administrative, executive, and deductive abilities, engineering and technical abilities, ability to think quickly, ability to act quickly and correctly, ability to handle men, and self-control. In this part require the assignment of marks on a convenient scale *to indicate the relative weight in the character of the individual being reported on* of the abilities enumerated. Marks should be assigned only for those abilities for which the subject of the report has given demonstration.

(e) Require reporting seniors to include in the report a definite statement of their estimate of the officer reported on and the lines in which his future work should be confined.

(f) Require the report to be submitted for all officers in the navy except flag officers; quarterly for ensigns, lieutenants, junior grade, and lieutenants, and semi-annually for the others.

(g) Require the report to be submitted by all immediate seniors, including division officers, heads of departments under whom the officer is serving, executive officers of ships, and immediate commanding officers.

To insure the proper attention to these reports there should be an office in the Navy Department, headed by a selected officer, with no other duties than to study, tabulate, and interpret these reports, and to furnish automatically to the proper authorities information of obviously unsatisfactory performance of duty by officers in the grades subject to Selection Out. In the latter cases it is quite possible that occasionally the fault will lie with the seniors. As these cases cannot be segregated, it is obviously only just to the junior to arrange another trial at once under different seniors. This should best be done by ordering him to another ship or station, without acquainting anyone of the reason for the

transfer. He will thus be put in the status of any officer ordered to new duty. If three such transfers prove necessary in the career of a young officer before he passes out of the grade of lieutenant, he should, on his fourth unsatisfactory report, be selected out as temperamentally unfit for the service. This should not involve retirement, but rather discharge with a year's pay, as the individual will still be a young man, physically able to make a start in civil life.

The plan for automatic Selection Out (retirement) of officers who have failed for Selection Up in the higher grades must have careful consideration. For instance, if being passed over by only one junior were considered sufficient cause for selection out it is evident that the Selection Board would be greatly hampered in its freedom to reach well down among the eligibles for especially able men. It would appear advisable, therefore, to permit a certain degree of passing over without causing selection out. The following conditions are suggested:

1. Automatic retirement will take effect if an officer is passed over by one-third or more of those selected up at any one time.

2. An officer who is passed over, but by less than a third of those selected up, will automatically retire upon the third such occurrence in one grade.

3. The Selection Board will be provided with data showing all eligibles who have previously been passed over, and whether once or twice.

For Selection Up it is, first of all, advisable to restrict the eligibles so that there will not be too great a field, otherwise pressure on the Selection Board due to service opinion may cause too rapid elevation of officers whose fitness for selection has not been fully demonstrated, and many good, though not brilliant, men may be overlooked and retired. It is suggested that a fixed proportion be established such that the number of eligibles is a multiple, say three times, of the number of vacancies to be filled.

In order to strengthen the certainty that the fitness reports are reliable indications of the qualifications for leadership there should be recourse to "service opinion" in a manner similar in principle to that of General Order 494. The practical details of this general order, however, appear to be somewhat defective, and these defects have aroused a considerable amount of destructive

criticism in the service, so that there is danger of the advantages offered by the plan failing to receive appreciation. The defects which deserve attention are as follows:

1. The Selection Board probably will be considerably influenced by the quantity of "votes" cast for an officer. This is characterized as giving selection the nature of a "popularity contest."

2. As there is no requirement that the reporting officer shall include in his list *only* the names of officers of whose professional fitness he has direct knowledge, it is evident that he *may* include names on purely unfounded opinion.

3. Personality is more apparent than is ability, and is more apt to attract attention among officers not well acquainted with the officer reported on.

4. Names omitted from a list because of lack of information are, with this plan, placed on a par with those omitted because of believed lack of fitness for selection. This is a real injustice to many capable and excellent officers who, for various reasons, may not be widely known.

5. There is no provision for indicating unequivocally those officers considered unfit for selection.

6. Because of the use of the term "lineally" in paragraph 9 of the General Order, the lists cannot be submitted in a form such that the Selection Board, recognizing the above defects, will be able to make a "qualitative" study of them.

These defects can be entirely eliminated and the very valuable measure of service opinion contained in these lists can be utilized if we keep in mind the principle of "qualitative analysis" rather than "quantitative analysis." In the belief that they will prove sufficiently self-explanatory, the following suggestions for employing these lists are submitted without further comment:

First.—Restrict the number of eligibles to three times the number of vacancies to be filled, counting from the top of the list; provided that in all cases of selection to the grade of captain there shall be a minimum of twenty-five eligibles, and for flag rank, a minimum of fifteen eligibles.

Second.—Extend the vote to all eligibles and to the entire commissioned personnel of the line senior to the eligibles. This will insure that each eligible will receive enough votes

to provide a good basis for comparison, and it will secure votes from all officers who logically can be considered fitted to hold opinions on the qualifications for leadership.

Third.—Require that each list shall contain the names of all eligibles of whose professional qualifications the reporting officer has *direct knowledge*, whether these eligibles are considered qualified or not.

Fourth.—Have the names on each list arranged in order of relative merit in the opinion of the reporting officer.

Fifth.—Require the reporting officer to draw a line through his list at the point which separates those officers whom he considers qualified from those he considers unfit for selection.

Sixth.—Require the reporting officer to sign his list. This will give the Selection Board an idea whether the names on the list are arranged by a leader of the sea-going type, or of the administrative or technical types.

Having at hand lists submitted in accordance with the foregoing, the Selection Board may then arrive at a qualitative estimate of the fitness for selection of each officer by the following method:

1. Starting at the bottom of a list, number the names serially upward from "1" until the line is reached.

2. Starting with the name immediately above the line, assign a new series of numbers beginning with (N+1), where "N" is the number of names in the list. If there is no line—in other words, if all officers on the list are considered worthy of selection—then the lowest name will receive the number (N+1).

3. Divide the number opposite each name by the number opposite the top name. This will assign a percentage to each name. The top name on each list will automatically receive 100 per cent, all names above the line will receive over 50 per cent, and no name below the line will receive higher than 25 per cent unless more than a third of the list is below the line.

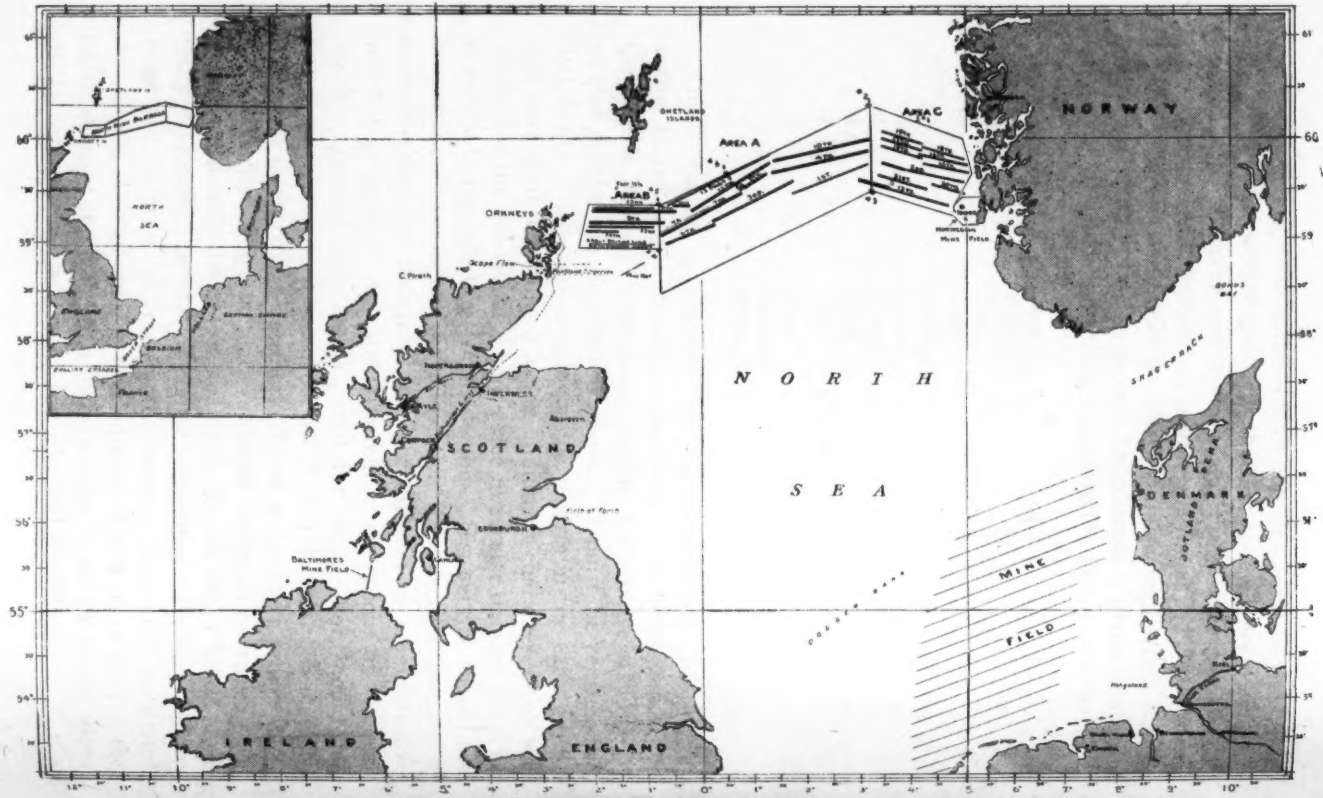
4. Add together all the percentages received by an eligible and divide by the total number of his votes. This will give his average percentage.

5. Arrange the names of all eligibles according to values of average percentages. In this list no evidence of number of votes received will appear, and the service opinion will therefore be indicated in a *qualitative form.*

The preceding description may sound complicated, but its actual application is very simple. An example is given below of a list of eleven names with three considered unfit for selection:

Serial No.	Name	Divisor	Percentage
19	Wilson	19	100
18	Green	"	95
17	Smith	"	90
16	Cook	"	84
15	Brown	"	79
14	Evans	"	74
13	Black	"	68
12 (N + 1)	Clark	"	63
3	Jones	"	16
2	Stevens	"	11
1	White	"	5

There remains to suggest that the consideration of the Selection Board proper should be restricted to the fitness reports of the eligible in his present grade, and to his relative standing in service opinion, as determined above. It must be remembered that faults which caused unfavorable reports in the early grades will have been put to good use in building a character which will obtain for the individual a high place in service opinion when he is available for selection for leadership. Sea service should not be considered an essential qualification for selection, because in modern times the necessity for specialization in administrative work is as great as for specialization in operations at sea, and distinct types of men are required for each. Nor should this board consider physical records, which can obviously be most intelligently interpreted by medical officers, guided by a proper statement of policy. Physical matters should obviously be investigated prior to action by the Selection Board, and an officer found physically disqualified should, of course, be retired. He may then be employed, if he so desires, in the manner previously suggested for officers selected out. If this retirement take place prior to the submission of the lists, then there will be no doubt in the minds of the service that the reason was physical disability.



THE NORTH SEA MINE BARRAGE.
Showing also Fowl Ground East of Dogger Bank due to Irregular Minefields.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE YANKEE MINING SQUADRON [1]

OR

LAYING THE NORTH SEA MINE BARRAGE

By CAPTAIN REGINALD R. BELKNAP, U. S. Navy
The Squadron Commander

PREFACE

In writing of the "biggest 'mine planting stunt' in the world's history"—to quote a Christmas greeting from Rear Admiral Clinton-Baker, head of the British minelaying force—I have endeavored to make an account that would be readable enough for general interest, largely for the reason that, compared to other operations, our undertaking received scant mention at the time. Its very nature required preparation in quiet and precluded discussion of its progress. Unnecessary technical detail has therefore been suppressed, although much could be written that would be welcomed by those versed in it.

The whole account is based on data obtained at first hand. The description of assembling the squadron for a mining excursion fits the third excursion rather than the first, but the difference is a minor one, affecting only the numbers present—six ships on the first excursion, ten on the third. All the rest is correct, in substance and details.

Besides influencing an early armistice, this great minelaying operation marks an epoch in the use of submarine mines in warfare. It was an event in military history, as well as a prominent operation, and the credit for it belongs not alone to the officers and men who were actually present but also to those of the old mine force, to whose services in developing, in our navy, the art of handling and laying mines in large numbers, the success of the great operation was so largely due.

Details of the mechanical development of the new mine itself have not been gone into, for obvious reasons. Justice to that part

[1] This article will appear in three installments.

could be done only by those who were directly concerned in it, but I am glad of the opportunity to express appreciation of the valuable service which was rendered to our cause in the war by Commander S. P. Fullinwider, U. S. N., in seizing upon and developing the long-sought means for such an undertaking, and by Lieut. Commander T. S. Wilkinson, U. S. N., and the officers and designing engineers in the Bureau of Ordnance and at the Naval Torpedo Station, Newport, R. I., by their skill and ingenuity in designing mechanical features, when normal experimenting was impossible.

As for the ships—the personal study which Captain J. D. Beuret (C. C.), U. S. N., made of the mine elevator problem was the foundation of its brilliant success, and the fact that, in the whole period of service, few alterations or improvements in the minelayers were found desirable, although suggestions were called for, is the best tribute to those who planned and carried out their conversion.

Only very inadequate expression can be given here to my appreciation of the services of my staff, in particular Captain H. V. Butler, U. S. N., whose excellent conduct of the flagship, supported by the indefatigable care of his navigator, Lieut. Commander J. C. Cunningham, U. S. N., made it possible to approach and navigate close to unmarked minefields in the open sea. And I was fortunate to have one so thoroughly loyal and capable as Commander B. L. Canaga, without whose unremitting attentiveness, and tactful management of countless details under difficulties, our performance would have been far less creditable.

Inseparable from our recollections will always be the excellent and friendly official and personal relations with the destroyer escort, especially when H. M. S. *Vampire* led. Captain H. R. Godfrey, C. B., D. S. O., writes, "It was the determination of every officer and man in the 14th Flotilla, who had the honor of being entrusted with the screening of the U. S. Minelaying Force, that no preventable attack by enemy submarine or surface vessel should inflict damage on any ship of the Force." It is but speaking for all of us to say, that is what we felt, from the first moment of that grey morning's meeting on the day of arrival.

NEWPORT, 15 June, 1919.

THE YANKEE MINING SQUADRON

CHAPTER ONE

THE MINE FORCE READY

The national anthem at morning colors woke me, and I arose and looked out. What a glorious sight! Green slopes in all freshness, radiant with broom and yellow gorse, the rocky shore mirrored in the Firth, which stretched, smooth and cool, wide away to the east and south, and in the distance snow-capped Ben Wyvis. Lying off the entrance to Munlochy Bay, we had a view along its sloping shores into the interior of Black Isle, of noted fertility. Farther out were Avoch, a whitewashed fishing village, and the ancient town of Fortrose, with its ruined 12th century cathedral. Across the Firth lay Culloden House, where Bonnie Prince Charlie slept before the battle. Substantial, but softened in outline by the morning haze, the Royal Burgh of Inverness covered the banks and heights along the Ness River, gleaming in the bright sunshine. And how peaceful everywhere! *Canandaigua* and *Sonoma* lay near by, the *Canonicus* farther out—but no movement, no signal, no beat of the engines, no throbbing pumps. All seemed resting from those last four days of our passage overseas, which had all but done away with sleep. My responsibility for the safe conduct of the squadron had ended at 1 a. m., when it dispersed at the buoy, whence the routes to our bases at Inverness and Invergordon diverged. The captains taking the ships to their berths singly, Captain Butler was up until 5 o'clock, needing daylight to take the *San Francisco* all the way in. Turned in at last, his servant and orderly at 8 o'clock were 45 minutes waking him.

The Senior British Naval officer, Captain H. F. J. Rowley, R. N., came on board early, to give us welcome, and then we went to our own chief, Rear Admiral Joseph Strauss, U. S. N., commander of the Mine Force, whose headquarters were here at Inverness, U. S. Naval Base 18. After taking a look over the base itself, Captain Murfin's work and province, we stayed to lunch at Kingsmills, a handsome place amid beautiful surround-

ings, bordering on the golf links, with gardens, tennis court, croquet lawn, and fishing brook, which Admiral Strauss, Captain Murfin, and some of the headquarters staff had rented. It was a satisfaction to everyone to see our chief so befittingly established, and this came out very effectively later, at a picturesque and enjoyable garden party given there on the 4th of July, an occasion which was being celebrated locally with unaffected cordiality. Altogether, we could feel ourselves fortunate in the beauty and attractiveness of our surroundings and also, as we soon found, in the hospitality and kindliness of the people.

The American Mine Force had come to Scotland, arriving May 26, 1918, to coöperate with the British in laying a great barrier of mines, from the Orkney Islands across the North Sea to Norway. To provide for doing our share, the small minelaying force which our navy possessed on entering the war, consisting principally of the old cruisers *San Francisco* and *Baltimore,* had been augmented by eight converted merchantmen. Only six weeks before, five of them had joined the *San Francisco,* the squadron flagship, at Hampton Roads, Virginia, fresh from the shipyards.

The program for the newly organized squadron contemplated the ships being in Scotland, ready for a minelaying operation, in 45 days from the time they left the shipyards. The work of conversion having been extensive and hardly finished, the new ships were very raw, having had but a few days to shake down. Troubles with engines and steering gear, lost anchors, fogs, and missing stores repeatedly interfered with training. Up to May 5, 1918, not a day had passed without a mishap or some forced alteration of plan. Instead of progressing to the rehearsal of a minelaying operation by the squadron, we had been unable even to keep all together for a single whole day. Yet we were preparing for an operation in which, with the ships steaming close together, all must go like clock-work, for hours without interruption.

Another week of training before going across would, therefore, have been amply justified, but the sense of urgency was too strong. Besides, our mine bases in Scotland needed the 500 men we were to bring them. So, after four hustling days and nights of final preparation, we had stolen away from Newport, Rhode Island, just after midnight of Saturday, May 11, 1918.

Started at last! And, thanks to coöperation far and near, better prepared than expected. There were a few quiet hours that

Sunday morning—then fog shut in thick until next day. This was trying, so early on the voyage, but as we kept together all through it, the experience only gave more confidence. Next, one ship's steering gear broke down, and she just escaped a fatal collision. The third morning, the same vessel broke down altogether. Through lucky foresight, a powerful tug, *Sonoma,* was with us, which towed the disabled ship 150 miles until next morning, when the break was repaired.

The submarines that soon afterwards appeared on our coast were known to be crossing the Atlantic now, so we had target practice next afternoon, to be ready for them. Then I felt we could give a good account of any surface attack. Torpedoes, fire, and collision were what we had to fear. All the ships had mines on board and, since we steamed only 500 yards apart, an explosion in one ship would have involved the others.

Crossing in our company was the big collier *Jason,* loaded with an aviation station outfit for Killingholme, England, which afterwards did good work. On the tenth day, heavy weather came on, and *Jason* disappeared in a black squall, rolling heavily and steering far off the course. She being a sister of the ill-fated *Cyclops,* and no trace of her showing in four days, added considerably to the anxiety felt as we entered the active submarine zone. Radio calls brought no response. We had all but given her up, when, at early daylight, just before the appointed rendezvous with the destroyers, she came lumbering up astern. And so, notwithstanding the many vicissitudes in 3000 miles steaming, we met the escort with our number complete and right on the dot, in time and place.

Our arrival off Inverness the following midnight, May 25-26, 1918, made the Mine Force complete as to constituent parts necessary for the operation in hand. The *Baltimore* and *Roanoke* had preceded the others, making us seven. Three more were still in shipyard hands, but there was no need to wait for them before beginning the minelaying.

Between operations the squadron was divided for loading, half at Inverness (Base 18), and half at Invergordon (Base 17), 30 miles away. Being intended for the storage and assembly of mines—all that we used came from America—these bases had scant means at first for assisting the ships. Their needs could be

supplied from the Royal Naval Dockyard and two depots, under Rear Admiral E. R. Pears, R. N., and Captain Tancred at Invergordon, and Captain Rowley at Inverness, who were always cordially responsive to our requests.

The motto for all American naval forces abroad, however, was to be self-supporting, and thanks to our provident first supply and to regular replenishment by the mine carriers, we had to draw on the British stocks for very little. After a month, the repair ship *Black Hawk* arrived. She took no part in minelaying, being always moored off Inverness, separate from the Mine Squadron and flying Rear Admiral Strauss' flag, but her equipment of machine tools and repair material made the Mine Force normally independent in regard to upkeep. Except for docking, we asked very little of the British in the way of repairs.

Upon one occasion, the soluble salt washers for the principal safety device of the mines nearly ran out, the local atmospheric conditions having caused many more to be used than estimated. No washers of the right size and kind were obtainable anywhere inside three weeks, and thus a shortage of these atoms—the size of a peppermint "Life Saver"—threatened to hold up the laying of 5000 mines. The *Black Hawk* had a steam press, however, and could make a die—and by the time they were needed, washers in plenty were ready—incidentally of better quality than before.

While the ships were unloading the mines they had brought, for overhaul on shore, and were coaling and otherwise preparing for minelaying, the larger preliminaries were taken up at a conference of Rear Admiral Strauss and myself with Admiral Sir David Beatty, Commander-in-Chief of H. B. M. Grand Fleet. Vice Admiral Brock, his Chief of Staff, Rear Admiral Clinton-Baker, the British Rear Admiral of Mines, Captain Lockhart-Leith, the head of his Staff, and Captain R. A. Pound, of the Admiralty, attended this conference, which was held on board the flagship *Queen Elizabeth*, at Rosyth, Thursday, 30 May, 1918.

First came the subject of tactics, and I explained my plan, to lay the mines with the squadron steaming in line abreast, ships 500 yards apart, making a trace on the chart like a music score. Three vessels (later five) would be laying mines simultaneously. When a ship had emptied herself of mines, her neighbor, ready and waiting while steaming alongside, would begin. At the end of the

minefield, some temporary small buoys would be planted, by which to pick the field up later, to continue it. This plan was accepted without comment.

The area to be mined having been publicly notified two months before, the enemy might have placed some mines there, on the random chance of damaging our force. The only arrangement practicable to meet such a contingency was for some of the destroyer escort to explore for mines ahead of the minelaying formation as it proceeded. Only those ships would be fully protected that might be following directly in the wake of the searching destroyers, the main purpose being to discover the existence of an enemy minefield in time for the squadron to maneuver aside.

A clear understanding was reached at the conference of the relation of the mine squadron and its escort to the supporting force. The mine squadron being lightly armed and of moderate speed, it would have been at great disadvantage against even a numerically weaker force of light cruisers, with their superior batteries and speed. Hence the need of the support, which would consist of a battleship or battle cruiser squadron, or both, and of light cruisers, according to the estimated risk of attack at the time. If attack threatened, the mine squadron and its destroyer escort would seek safety in the direction ordered by the Support Commander; otherwise they would proceed on their mission and return to base afterwards, according to the program for that occasion. The destroyer escort would be of strength sufficient to ward off any probable attack by submarines or by surface vessels that might elude the supporting force and the regular patrols.

The location of the first minefield was decided upon; then further details were settled with Vice Admiral Brock and Rear Admiral Clinton-Baker, for the first mining excursion, which was to be done by the American and British squadrons at the same time. Preparatory notice was to be given by the Commander Mine Force to the Admiral of the Grand Fleet at least four days before the time the mine squadron was expected to be loaded and ready for an excursion. Upon a second, definite notice, not less than 48 hours in advance, when it was certain that the squadron would be ready, a combined operation order would be issued by the Admiral, naming all the forces concerned and containing the instructions and intelligence necessary for all.

After lunching on board with Admiral Beatty, Rear Admiral Strauss and I took our leave. We had a look at Holyrood Palace and a walk through Canongate Street that afternoon, returning to Inverness next day. Not enough material had yet been accumulated to assemble mines to fill all seven minelayers present, but 3400 would be ready in a few days, sufficient to lay a field 47 miles long, consisting of one row of mines at each of the three levels prescribed. A mine embarking schedule was made out accordingly, to include *San Francisco, Baltimore, Roanoke, Canandaigua, Canonicus,* and *Housatonic,* for a start on June 7.

CHAPTER TWO

THE NEED AND THE MEANS

A barrier of high explosive across the North Sea—10,000 tons of TNT, 150 shiploads of it, spread over an area 230 miles long by 25 miles wide and reaching from near the surface to 240 feet below—70,000 anchored mines each containing 300 pounds of explosive, sensitive to a touch, barring the passage of German submarines between the Orkneys and Norway—this was the final five months' contribution of the American and British mining forces towards bringing the war to a close.

To stop the enemy submarines near their bases, before they could scatter on the trade routes, would obviously defeat their campaign more surely than merely hunting them at large. That was the purpose of the Northern Mine Barrage, which, with the barrage at Dover, made it not impossible but extremely hazardous to enter or leave the North Sea. That many a submarine came to grief in attempting these barriers is now a certainty, and the establishment of the Northern Barrage, which many had thought impossible, insured the early finish of the submarine campaign.

The resumption of ruthless submarine warfare became a serious threat to the cause of the Allies, and at the time of our entry into the war their situation was critical—how much more critical than the world was allowed to know at the time, Admiral Sims has disclosed in his "The Victory at Sea." The relief brought about through the convoy system, in which our destroyers, the navy's first participants, had a large share, was immediate and important. But the submarine menace was far from ended and—according to the best information—would soon be greatly augmented, while the increasing number of transports would offer the enemy more opportunities, with the added horror of troopship sinkings in prospect.

Of further measures, the most effective would be such a blockade as would keep the submarines in or from their bases. The British had already mined a large area north and west from Heligoland, but this obstruction was not insurmountable, for the

Germans from nearby could always clear a passage through when wanted. In any case, until the Skagerrack passage were closed, the submarines might use that route without hindrance. Two weighty reasons kept the Skagerrack open—unwillingness to violate neutral waters, and the ease with which German forces could raid any barrier near their bases. It may be recalled with what sudden damage a small German cruiser detachment raided a convoy just outside the Skagerrack, in October, 1917.

To be effective, therefore, any barrier must be beyond easy reach of a raiding force and cover the Skagerrack, and must also be far enough to the northward of the British bases not to hamper the battle fleet's engaging with the enemy. Hence, the anti-submarine barriers should be, one near Dover Strait, the other across the North Sea, from Scotland to Norway.

The closing of Dover Strait, undertaken by the British Navy alone, needs no further mention here. Although the strong tidal currents there, frequent rough seas, and hard, smooth bottom were unfavorable for minefields, other means—such as a line of guard vessels moored not far apart and equipped with powerful searchlights, together with numerous active patrollers—were employed with a considerable degree of success.

The Northern Barrage would be too long a front, and much of it too far from base, for effective patrol without a great number of vessels. A wide, thickly sown minefield, however, would watch night and day in all weathers without relief, and would be even more effective against passage submerged than against passage on the surface, because of the less wear and disturbance of the mines by wave action, deep down under water.

Currents were not strong in the northern location, but the bottom lay as deep as 900 feet, whereas 300 feet had heretofore been the deepest water ever mined. Merely to provide the mines meant a large undertaking, besides involving an enormous quantity of the same high explosive which was likewise in heavy demand for shells and bombs. Supposing the mines ready, the planting of so many would be a long and dangerous operation, employing all the Allies' existing minelayers indefinitely. And neither the British nor ourselves yet had a mine that was quite satisfactory for the prospective requirements.

Our Naval Bureau of Ordnance, however, was intent on finding the means for such a barrier, so that when, in May, 1917, among the many contrivances offered for winning the war, Mr. Ralph E. Browne, an electrical engineer of Salem, Massachusetts, presented his submarine gun for consideration, Commander S. P. Fullinwider, U. S. N., in charge of the Bureau's mining affairs, saw that, although the invention was not suitable for naval purposes in the form offered, a new electrical device which it contained, if applied to the firing mechanism of a submarine mine, would result in just what we were looking for—a mine at once sensitive and far reaching. Mr. Browne collaborated with the Bureau of Ordnance in developing the new mine-firing device. By July, 1917, all doubt as to its practicability had been dispelled and the Bureau of Ordnance was able to give assurance that, in urging the closing of the German bases, our navy might offer the means.

Extravagant claims were common in the field of mining inventions, and three years of war lessons in the perversity of mines made the British naturally skeptical of this American find. An experienced officer in mining was sent over to see, Lieutenant R. H. DeSalis, R. N., who had received the D. S. O. for some minelaying on the Belgian coast. As the new device was put through its paces before him, the chill thawed out and in two hours he had become almost an enthusiast. Upon his report the British Admiralty took up the plan with active interest.

Upon returning from London in mid-October, 1917, Admiral Mayo, of our Atlantic Fleet, brought back the outline of a proposed minelaying operation. The paper was quite informal—unsigned, undated, bearing in pencil across the top, "Admiralty would be glad to learn whether Navy Department concur in the plans as shewn."

The field was to be 230 miles long—the distance from Washington to New York—divided into three parts, the middle section, of 135 miles, called Area A, allotted to us, because the reach of the new American mines was greater than ordinary—three of them covering the same extent as eight mines of other types. Thus numbers and effort were saved.

There would be three "systems," each consisting of one or more rows of mines just below the surface, dangerous to any craft, and other rows at intermediate and extreme depths, so that,

whether running on the surface or at ordinary submergence or as deep as 240 feet, a submarine had the odds against her. In the absence of patrol vessels to drive them down, submarines would naturally run on the surface, and so the rows of upper level mines were made more numerous than those at deeper levels. The stroke of a mine is sudden and powerful, and while a vessel on the surface may survive it, to a submerged submarine it is usually fatal. All classes of vessels shy at a minefield, and that the Germans shared this aversion was shown by captured papers, which made it clear that the submarines dreaded nothing so much as mines.

The scheme was unprecedented, and that its great magnitude would involve a mass of detail requiring very careful adjustment was evident on the most cursory examination. Some who heard of it regarded it as impossible, and foolish to attempt. As to the new mines, the very basis of the whole project—since a complete unit would not exist for several months, the statement of Rear Admiral Ralph Earle, Chief of the Naval Bureau of Ordnance, that the mines would be forthcoming in season, had to be based upon tests of the mine only by parts, with the assumption that all would function properly when assembled. Action upon that assurance would at once involve upward of forty million dollars, which made his stand a bold one, inviting unmeasured odium, should the mine after all fail. To await the mine's final proving, however, would have been fatal to any possibility of beginning the barrage before 1919.

The task of laying the barrier would be hazardous in itself, with constant danger of interruption by the enemy. A single minefield in the open sea, or widely separated ones, presented no extreme difficulties, but to lay a series of them so close together as to leave no considerable gaps between, made a problem for which no really practical solution was yet visible.

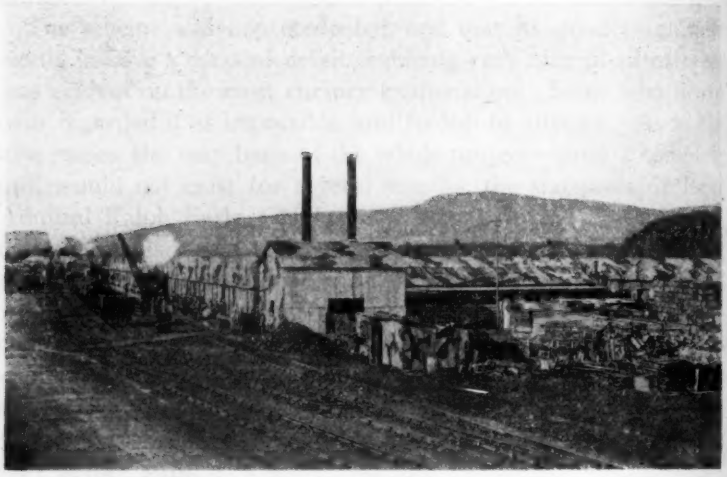
For four days the project was under consideration by the Naval General Board at Washington. Time pressed, the need was great, the new mine very promising. The attitude of our officers was favorable. My own expressed view, based on three years' experience in mining, was that, though much greater difficulties and magnitude would develop even than yet foreseen, the scheme was nevertheless feasible, was within our minelaying experience in principle, and, though it could hardly be more than half or a

quarter effective, it was well worth doing. The British Admiralty's approval and belief in the practicability of the scheme was implied in the original paper, but an explicit confirmation was asked and obtained by cable, on the basis of their three years' war experience and knowledge of North Sea conditions. And so the plan went to the Secretary of the Navy bearing the General Board's approval, as promising a sufficient degree of success to warrant undertaking it.

CHAPTER THREE

THE BASES IN SCOTLAND

The British Minelaying Squadron was to operate from Grangemouth, near Rosyth, on the Firth of Forth. As a mine assembling and operating base for the American Squadron, the British naval authorities decided on Inverness and Invergordon, in the Scottish Highlands, situated on Inverness Firth and Cromarty Firth, re-



MINE ASSEMBLY AND STORAGE SHEDS.
U. S. Naval Base 18, Inverness.

spectively, which empty into Moray Firth about eight miles apart. One base would have been enough and in some respects more convenient, but the limited transportation means across Scotland necessitated two. To require the slow mine carriers to navigate the difficult passages around the north of Scotland would prolong their exposure to submarines and cause more escort duty for destroyers, so it was decided to discharge their cargoes on the west side, at points which gave a short haul across Scotland—Fort William, at the western terminus of the Caledonian Canal, and Kyle of Loch Alsh, where one crosses to the Isle of Skye. The cargoes were transported by canal motor-barge and by the Highland Railway.

In order to issue mines to the ships ready in all respects for planting, the bases needed a large number of men for shop work, besides others for transportation, police, clerical work, messmen, and sanitation. The entire establishment on shore was under Captain O. G. Murfin, U. S. N., who had 20 American naval officers and 1000 enlisted men at each base, 3 officers and 60 men at each of the unloading points, Fort William (actually at Corpach village) and Kyle. Headquarters was at Inverness, because of its superior communications and more central location. Captain Murfin had sailed November 13, for England, to supervise the preparation of the bases. With him had gone Commander T. L. Johnson, then commanding the small minelayer *Dubuque,* who was to inform himself fully on the situation and return to Washington as soon as practicable with answers to a long list of questions—everything we could then think of as useful to know for intelligent coöperation in the preparations.

The large, substantial, stone buildings of two idle distilleries, Dalmore, three miles out from Invergordon, and Glen Albyn, at Muirtown, where the Caledonian Canal locks out to Inverness Firth—clean, dry, and well ventilated—gave excellent living accommodations for the men. The smaller buildings made suitable offices, but considerable additions were made for messing, cooking, and washing arrangements. A Y. M. C. A hut was established in each base, and at Inverness the little Muirtown Hotel was transformed into a small hospital. This, and similar provision at Dalmore, all under Captain E. J. Grow (M. C.), were for mild or emergency cases. The main dependence for hospital care was Strathpeffer—a " hydro " cure in peace time—20 miles from either base. There a U. S. Naval Base Hospital of 1000 beds had been established, under Captain E. S. Bogert, Medical Corps, with the Leland Stanford unit.

The buildings for mine assembly and storage were erected on adjacent vacant land, spur tracks being brought in from the main railway line, thus making good communication between the two bases, as well as with their receiving sources and shipping out points. Most of the machine tools and other shop and office equipment, as well as furnishings for the men's use, came from the United States.

Some dredging was done in Inverness Firth to admit our minelayers into Beauly Basin, near the canal entrance. The navigation

marks for entering the Firth were improved, because ordinarily vessels of our size seldom came in there, and then only by day. In addition, the whole length of the Caledonian Canal was lighted, for night navigation by the mine carrying lighters.

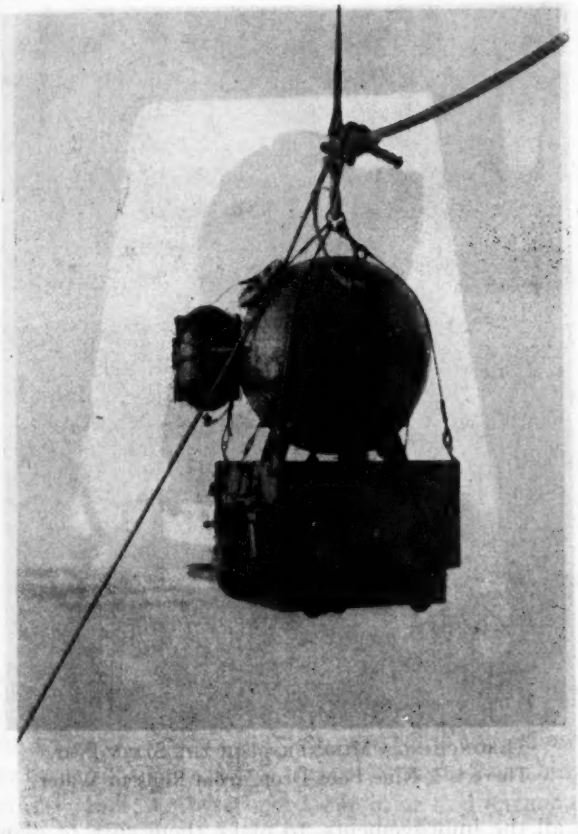
Labor was scarce in the Highlands and the weather that winter was severe. The work went slowly, delayed considerably beyond expectation. Captain Murfin had many discouragements, and disappointments in deliveries from the United States. In spite of the kindness of all about him, he must often have felt very far away from home; but afterwards, the frank admiration repeatedly expressed by all visitors to the bases must have repaid his six long months of effort. In the end, the bases were ready in time, and their capacity, and the rate of transportation as well, were twice the original estimate, the two bases together being capable of assembling 1000 mines a day ready for planting.

Sending over the base personnel began with small drafts in December, but as accommodations for the full number were not ready soon enough, and the demand to use all transportation for troops became pressing during the Germans' great drive in March, 1918, the base complements were not more than about two-thirds full when the mine squadron sailed from the United States coast in May. The greater part, 750, of the number then lacking had therefore to be brought over by the squadron. Though this retarded the proper organizing of the base personnel, it did not delay the minelaying.

CHAPTER FOUR

THE SUPPLY OF MINES

In the same past six months other preparations, too, had been pushing ahead, both at home and abroad. Providing the mines—

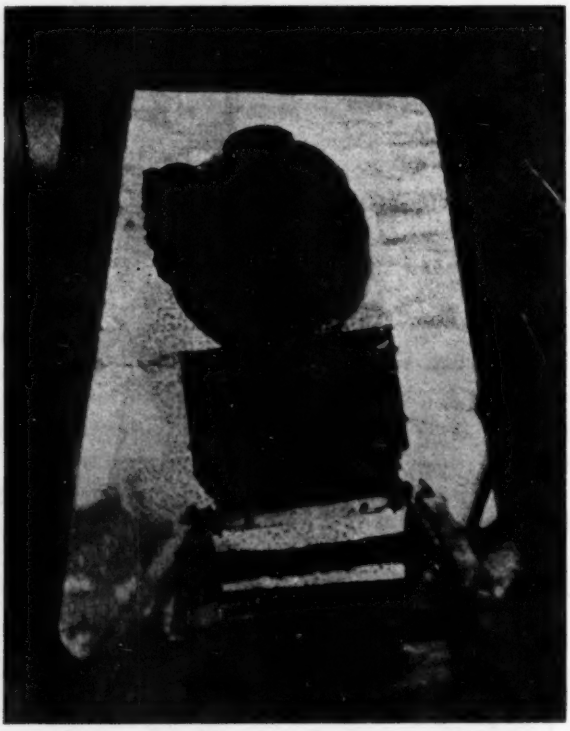


A MINE IN MID-AIR, BEING HOISTED IN.
The Plummet is at the Lower Left Corner.

the task of our Naval Bureau of Ordnance—would alone make a story of great interest. Considering how long it had taken to develop previous types of mines, to have made a success of an invention that was new since our entering the war was indeed

remarkable, the more so from inability to test a single mine complete before ordering 100,000.

Mines for the open sea in great numbers, moored "flying"—that is, by ships steaming at considerable speed—need anchors with automatic depth regulation. Such mechanism had undergone important changes during the war, and the new American mines



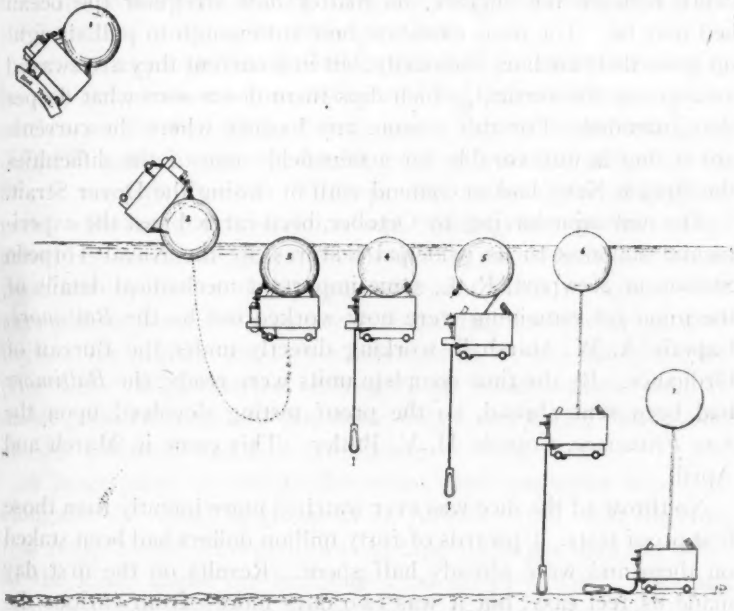
LAUNCHING A MINE THROUGH THE STERN PORT.
There is a Nine-Foot Drop, from Rails to Water.

needed all the improvements, to make them sure to plant at the intended level. They were to be much deeper than ever attempted before, and also in deeper water.

Three British officers of considerable mine experience assisted here, Lieut. Commander H. O. Mock, R. N. R., Lieutenant R. H. DeSalis, R. N., and Lieut. Commander Harold Isherwood, R. N. V. R. The last was an expert designer, and had an important part

in planning our new mine anchor, which was similar to a late model British mine anchor.

A submarine mine of to-day consists of a mine case, shaped like a ball or egg, about one yard in diameter, mounted on an anchor in the form of an iron box about 30 inches square, connected by a wire rope mooring cable, about ⅜ inch in diameter. The mine case contains the charge of high explosive—300 pounds of TNT in our mines—and the firing mechanism. The combination stands about 5 feet high and weighs 1400 pounds. Four



THE SEQUENCE OF OPERATIONS AFTER A MINE IS LAUNCHED.

small car wheels on the anchor run on steel tracks, allowing the mines to be easily moved along the decks to the launching point.

When the mine dives overboard, the mine and anchor come to the surface and float for a time, still held together, part of the mine case above water. Outside the anchor is a 90-pound plummet, containing a reel of ⅛-inch diameter steel wire "plummet cord," made the same length that the mine is to be below the surface. Thus, if the mine is to be 160 feet beneath the surface, the cord is made 160 feet long. The plummet drops off when the mine goes overboard, unreels its cord, coming to the end with a jerk

that trips the slip hook which holds the mine and anchor together. The pull on the cord also lifts the latch on the reel inside the anchor, allowing the mooring wire to unwind. The nearly solid plummet tends to sink faster than the more bulky anchor, thus keeping the cord taut until the plummet strikes bottom. The cord then at once slackens, releasing the latch, locking the reel, and preventing any more mooring wire unwinding. The anchor, continuing to sink, pulls the mine under until the anchor strikes bottom. The mine is thus finally moored always at the desired depth beneath the surface, no matter how irregular the ocean bed may be. The mine cases are buoyant enough to pull straight up from their anchors ordinarily, but in a current they are swayed away from the vertical, which dips them down somewhat deeper than intended. For this reason, any locality where the currents are strong is unfavorable for a minefield—one of the difficulties the British Navy had to contend with in closing the Dover Strait.

The new mine having, by October, been carried past the experimental stage as to its principal features, by the Naval Torpedo Station at Newport, R. I., some important mechanical details of the mine yet remaining were now worked out by the *Baltimore*, Captain A. W. Marshall, working directly under the Bureau of Ordnance. By the time complete units were ready, the *Baltimore* had been sent abroad, so the proof testing devolved upon the *San Francisco*, Captain H. V. Butler. This came in March and April.

No throw of the dice was ever watched more intently than those first proof tests. Upwards of forty million dollars had been staked on them and were already half spent. Results on the first day made us feel easy, but it was two days more—from various delays—before we succeeded in exploding a full loaded mine. This had been planted in Chesapeake Bay, well marked and guarded, in the very same deep hole where a whirlpool effect troubled the German submarine *Deutschland* on her first return trip. It was not possible to place the mine far from the fairway, however, since the water elsewhere was not deep enough for our purpose. Early the second morning, the battleship *Arizona* came along, heading too near it. The signal "You are standing into a minefield!" sent her rudder hard over and engines full speed astern. We could see the mud stirred up, from two miles away. Since we could not get the mine up, what a relief it was when it was set off at last by sweeping!

The final proving of the mine as a whole, which was completed in April, off Cape Ann, did not take place until after several cargoes of mine parts had been shipped abroad, but the mine's success, from its first trials, showed how careful and observant had been all those who were concerned in its designing and testing.

The prospect in October was that the shipment of mines would begin in January, but through delay in completing the detailed plans and from the abnormal industrial conditions prevailing, these shipments did not attain a regular flow until May, so that the ships and the mines were ready together.

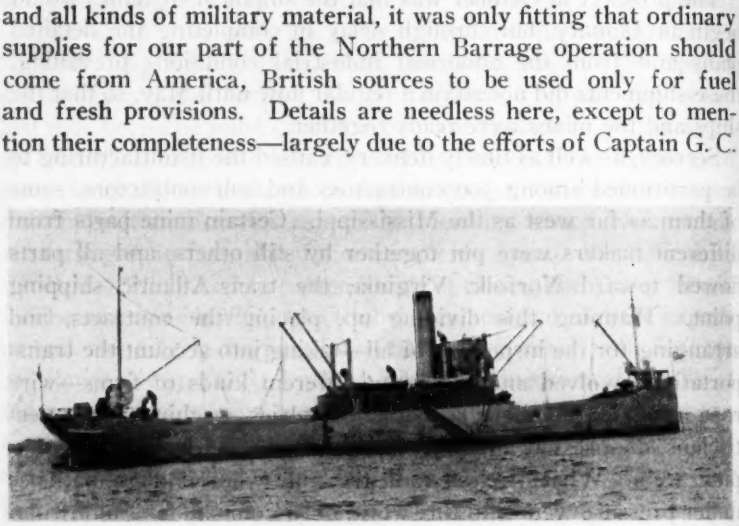
Secrecy, as well as timely delivery, caused the manufacturing to be partitioned among 500 contractors and sub-contractors, some of them as far west as the Mississippi. Certain mine parts from different makers were put together by still others, and all parts flowed toward Norfolk, Virginia, the trans-Atlantic shipping point. Planning this dividing up, placing the contracts, and arranging for the inspection of all—taking into account the transportation involved and the many different kinds of firms—wire rope makers, automobile concerns, foundries, machine shops, electricians, die-presses, and even candymakers—it was indeed a complex web. What tireless industry and what endless patience under pressure went into this work, only Commander Fullinwider and his assistants can fully appreciate.

A large plant to charge the mines with explosive was built alongside the Naval Magazine at St. Julien's Creek, near the Norfolk Navy Yard. This plant was of capacity larger than any other of the kind, ample for handling 1000 mines a day. The high explosive was melted in steam kettles to about the consistency of hasty pudding, and drawn off, 300 pounds of TNT at a time, into the mine spheres. An automatic device shut the flow off at the right weight, and a mechanical conveyer carried the mines along slowly, to the pier end, by which time they would be cool enough to load into the waiting ship. Hot work around those steam kettles through the long summer! A quiet but important corner, handling 25,000,000 pounds of TNT, with constant risk from fire. Several of the sailors were overcome by the kettles' poisonous fumes, and one died. The duty was monotonous and inconspicuous but was done with praiseworthy faithfulness.

CHAPTER FIVE

GENERAL SUPPLIES AND TRANSPORTATION

Under the extraordinary demand prevailing abroad for food and all kinds of military material, it was only fitting that ordinary supplies for our part of the Northern Barrage operation should come from America, British sources to be used only for fuel and fresh provisions. Details are needless here, except to mention their completeness—largely due to the efforts of Captain G. C.



A MINE CARRIER STEAMER.
Twenty-Four of These were Constantly Employed to Transport the Mine Parts Over to Scotland for Assembly and Laying.

Schafer of the Pay Corps. After starting things fair at home, he sailed about mid-December for England, where the needs of the bases could be best determined. With him went Assistant Paymaster R. N. Smither, U. S. N. R. F., who later became his successor, and Lieutenant Thomas Newhall, U. S. N. R. F., who had been enrolled for duty principally in connection with transporting the mine carriers' cargoes across Scotland. His experience in railroading and his tactful energy made a valuable asset. After their departure, purchases and deliveries were followed up indefatigably by Assistant Paymaster A. B. Peacock, U. S. N. R. F., who was quite successful in bringing pressure to bear effectively. One morning, after a certain freight car had been missing for two weeks, he reported that eight railroad presidents were

now interested personally in the search—and the car was then found.

For transportation beyond the seaboard, cargoes of mines must go in special ships, which could carry also the general supplies for the operation. The mine carriers should be small rather than large, to minimize the effect on the progress of the operation in the event of losing one. About 60,000 tons in constant employment being needed, 24 of the so-called "Lake" steamers were selected, built on the Great Lakes for coastwise service, of 2500 tons average capacity. They were armed against submarines, manned by naval crews, and would sail in convoy, two or three every eight days, beginning in February. Their fitting out and management came under the Naval Overseas Transport Service, which furnished them according to schedule. Slow speed, due to their small size and cheap build, made them good prey for submarines, which sank one of these carriers in April, the *Lake Moor*, with 41 of her crew—almost our only loss of life in the whole operation. This was another part of the whole operation that was obscure, though all-important, which would yet have been very conspicuous had it not been so well done.

The great amount and the dangerous nature of these cargoes needed special arrangements for embarking them, for which Southern Railway Pier No. 4, at Pinner's Point, opposite Norfolk, Virginia, was taken exclusively. This pier being large enough to assemble several cargoes at once, the entire cargoes could be loaded there, and that was the plan, until the great disaster at Halifax aroused strong local opposition concerning the place of loading the mines on board. It was too late then to relocate the plant for charging the mines with TNT, and as the ground of local opposition was undeniably well taken, a real problem was presented. To take the loaded mines in lighters from the magazine 17 miles to the Explosives Anchorage, as first proposed, would have been very slow—almost impossible in bad weather—even had ample towage, lighterage, and labor been available, besides involving an extra handling for every mine, with attendant damage and risk. Thanks to the timely exertions of Captain W. J. Maxwell, U. S. N., who was in general charge of the loading and despatch of mines, a channel was dredged up to the magazine pier, where the steamers could embark the mines directly, after loading

the unobjectionable part of their cargoes at Pier 4. Thus local interests were quieted with the greatest measure of safety.

Several ingenious arrangements were devised for handling the mine material quickly. Two mine anchors fastened together, 1600 pounds, could be trundled about by one man, making a considerable labor saving on loading 2000 in one cargo. The pier became also the sub-assembly point for some mine parts, requiring a shop, as well as shipping organization. All was done by naval enlisted men, under the supervision of Lieutenant A. J. Love and Lieut. Commander R. E. Corcoran (P. C.). It was not long before these steamers began to take supplies also for our Battle Squadron with the Grand Fleet, 500 tons at a time.

CHAPTER SIX

A SAMPLE OF QUALITY

While details were shaping for proving the mine early in March, an urgent request came from the British Admiralty for one or more minelayers to help lay a field in the North Irish Channel. This passage was used by slow convoys to the west coast, making port first at Lamlash in the island of Arran, and submarine activity here needed to be checked. The sinking of the *Tuscania* had taken place in this vicinity.

At that time, only the *San Francisco* and *Baltimore* could be considered for this duty, and as the former was flagship, the *Baltimore* was sent. To "How soon can you go?" over long distance wire, Captain Marshall answered "Right away," guessing at the destination, and on March 4 he sailed from New York to join H. M. S. *Leviathan* as escort for a fast convoy out of Halifax.

By popular standards, the *Baltimore* was a musty back number—years older than many of her officers and crew—but she had been at Manila Bay with Dewey and had otherwise distinguished herself in a long and varied career. Though classed as a poor steamer, the ease with which, time after time, she produced extra speed at a pinch was a standing joke. Thanks to a good overhaul early in the war and to the ability and contagious enthusiasm of her engineer, Lieutenant R. P. Molten, U. S. N., she now topped a 9-day transatlantic run at 13 knots, for the most part in rough weather, with a three-hour spurt at 18.6 knots—2 knots faster than was supposed to be safe for her engines—just to keep pace with the *Leviathan*.

She arrived at Greenock, Scotland, March 17, ready for work, but was so much earlier than expected that her first mines were not delivered until April 13. Without any preparatory trials, though the mines were British, of a type new to the *Baltimore*, she went out at once, beginning the deep minefield between the island of Islay and the Irish coast, which was to prevent submerged but not surface passage.

More mines in excess of her reported capacity having been sent to her, 10 had to be carried on the upper deck, and the last one of these mines, in going down the elevator, was jambed, due to

the roll of the ship, and held suspended in the elevator shaft. William J. Powers, gunner's mate, 1st class, promptly of his own initiative, at imminent risk of the 1800-pound weight falling or one of the mine's firing horns breaking, removed the detonator and with it the great menace to the ship. Before the *Baltimore's* next trip, her own mechanics extended the launching deck tracks, to accommodate 180 instead of 170 mines, since the British naval authorities wished her to plant the larger number each time. Four times more she planted 180 mines, April 18, 21, 28 and May 2, planting always at night, in an area infested with submarines.

Extra careful navigation was required, both to lay the mines just where intended, as their anchor cables had been cut to fit (anchors not automatic), and to approach close to the minefields previously laid, yet avoid them. In one such operation, the gyro-compass went wrong at a critical moment. The navigator, Lieut. Commander George W. Hewlett, U. S. N., kept his head and held his peace, applying the corrections to the magnetic compass with coolness and accuracy, as if maneuvering to avoid a sand bank, instead of to clear a minefield by only 500 yards.

The *Baltimore* laid this whole minefield unassisted, 899 mines in all. She worked directly under Rear Admiral Clinton-Baker, R. N., who wired his congratulations upon the successful completion of the first three operations, and when, at the end of May, she was recalled to our squadron, he wrote to Captain Marshall:

> Once more I wish to thank you for all that you have done and for the very willing help which you, your officers and ship's company have always given. It is much to be regretted that the work which you commenced and so admirably carried out is not to be completed, at any rate for the present, though doubtless you will be doing equally useful work elsewhere in the near future. Good luck to you and your ship.

This minefield accounted for two enemy submarines and there was little further submarine activity in that vicinity, which should be credited largely as an achievement of our squadron. And as a sample of quality before the North Sea mining began, the *Baltimore's* work gave our colleagues confidence that we could do our part—by far the largest portion—in that great, open sea operation. As immortalized in our song:

> "The *Baltimore* was the first away.
> She traveled a thousand miles a day,
> To show the Allies the lively way
> Of the Yankee Mining Squadron."

CHAPTER SEVEN

MINE ASSEMBLING AND EMBARKING

Following the conference on board the *Queen Elizabeth,* our bases worked full blast on the mines for the first operation. One group assembled and tested the anchors, another the mines, a third the plummet, a fourth the plummet and anchor together, and a fifth, the final assembly, of mine and anchor complete—called a unit. A section of mine track of standard gauge sufficed to test the anchor wheels and thus obviate trouble on board from their binding or dropping between the ship's tracks during mine-

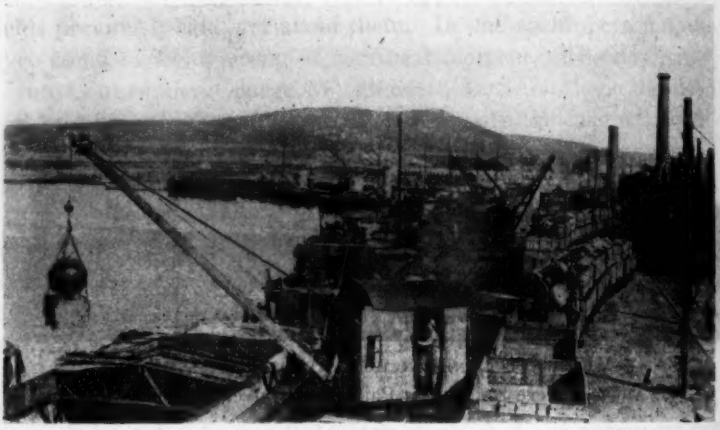
MINES AND MINE ANCHORS AWAITING ASSEMBLY.
The Anchors were Shipped in Pairs, for Convenience in Handling.

laying, possibly causing an interrupted string. It speaks well for the manufacture, for the testing at the bases, and for the ship's mine track installations, that no such interruption ever occurred in the whole series of operations.

The adjustment of firing mechanism was done in a locked room, the secret entrusted only to a few. It was delicate work, to be done patiently and methodically, for its accuracy determined whether the mine would be alive—or a dud. Fidelity in such adjustments is hard enough to maintain when the repetitions are numbered only by tens. Where hundreds and thousands are involved the tax on attention becomes severe.

Before loading the mines into the cars, for transfer to the lighters, each mine was primed with a mealed TNT "booster" charge and the firing detonator was put in place—all ready for the

laying—and five safety devices were seen in place and in order. These devices would prevent the firing mechanism working until the mine had reached a certain minimum depth under water and had been in the water about 20 minutes, and would also prevent exploding in case of loss overboard during embarking. Such devices usually function properly, and dependence is not placed on one alone but on several together, any one of which will make the mine safe to handle—by experienced men. At an early stage in the training in mines, one learns to treat them with respect *always*—no liberties. Even the safest explosives, the surest mechanism, have an occasional, inexplicable aberration.



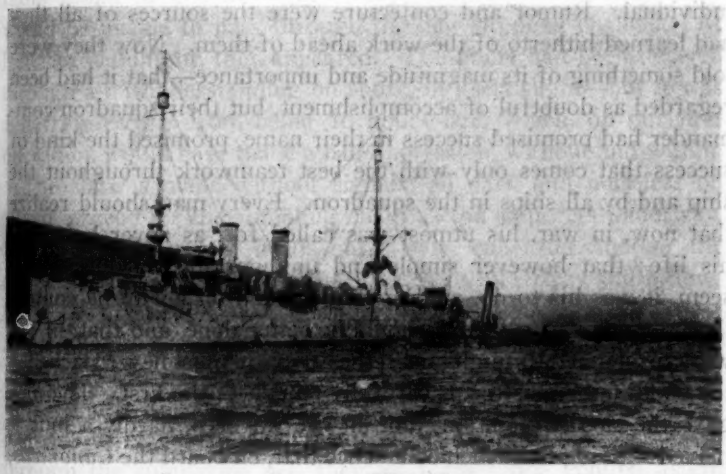
LOADING MINES INTO LIGHTERS.
At Base 18, on the Caledonian Canal, at Inverness.

The ready mines are swung up into open freight cars, for hauling to the water side, whence they go, 40 to 80 together, in lighters out to the ships. After being landed on the tracks of the minelayer, one safety pin is removed—leaving four—and the mine is then examined for any derangement during the three handlings in transit from the store shed.

The north of Scotland was a barred area, yet it was reported possible for information to get through to the enemy in 18 to 20 hours—time enough for interference to hatch out. With so much activity at the bases, lighters going to the ships loaded and returning empty, and a large destroyer escort coming in on 5 June, the

fact that an operation was in early prospect was obvious. The *hour* of departure at least could be kept secret, and the start was fixed for midnight. The two detachments of the mine squadron and the destroyer escort would assemble at 1 o'clock a. m., 7 June, just outside the Sutors, the high rocky headlands at the mouth of Cromarty Firth. On this first occasion the preparations continued until one hour before the ships weighed anchor.

Rehearsal of this operation had been impossible except on paper, but careful study of it had produced instructions that were comprehensive, yet elastic enough for emergency. The order for the



SQUADRON FLAGSHIP "SAN FRANCISCO."
Receiving Mine Lighters Alongside in Inverness Firth.

operation gave a complete program, including a mining schedule showing the time when each ship was to begin laying and how many mines to plant. This was gone over with the captains, and then Captain H. R. Godfrey, R. N., and I had a conference with Rear Admiral Strauss, on the general features of the excursion. Captain Godfrey, commanding H. M. S. *Vampire* and the 14th Destroyer Flotilla, was our first escort leader.

Our operation was to be no "captains' fight." Teamwork was indispensable. Every ship must keep in her station throughout and do her allotted stint exactly on time. The instructions said, "Once begun, keep strictly to schedule times, regardless of the

omission of signals or delay in them." Otherwise there would be gaps in the barrier, impossible to fill without waste of time and space, and mines would be brought back that should have been planted. Teamwork in the high degree wanted meant every man alive to his interest in the general result and sensible to his responsibility for his part in it. All would learn this in time, but it must be driven home beforehand. It was of utmost importance that the first operation should be an unquestionable success.

Accordingly, after making the preliminary inspection of each new ship, I spoke to each ship's company, partly to comment on their work so far, but chiefly to enlist the best efforts of each individual. Rumor and conjecture were the sources of all they had learned hitherto of the work ahead of them. Now they were told something of its magnitude and importance—that it had been regarded as doubtful of accomplishment, but their squadron commander had promised success in their name, promised the kind of success that comes only with the best teamwork throughout the ship and by all ships in the squadron. Every man should realize that now, in war, his utmost was called for, as never before in his life; that however simple and unimportant his duty might seem, it was his to do, and he was counted on not to be content that any other man's work should be better done, and that, in our work, prolonged through hours, the attention must never slacken—the 600th mine must be as carefully tended as the first. The men gave the closest attention—not an eye wavered, hardly a muscle moved—giving back such confidence that, on board the *Canonicus*, which I had found in fine condition, I could wind up with, "And when the last mine is out, the only signal I expect to send to you is '*Canonicus* well done'!"

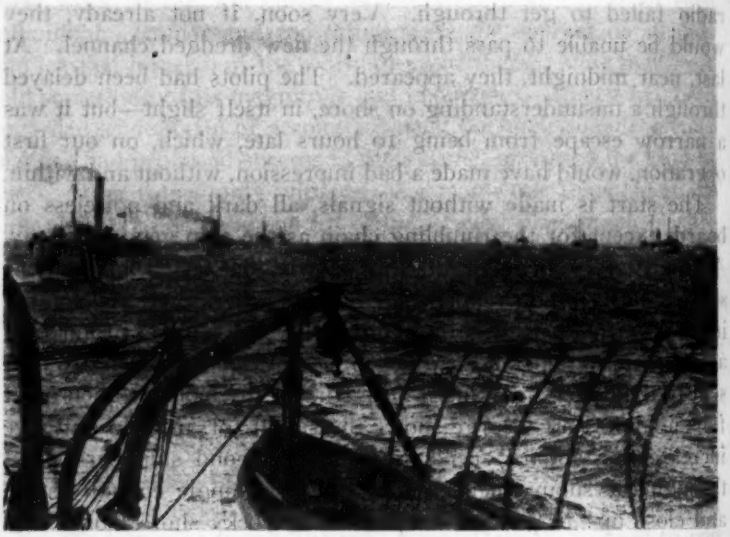
CHAPTER EIGHT

THE FIRST MINELAYING EXCURSION

The eve of our first departure was drizzling and misty. Attempts for some advance sleep were of no avail—too much pressure had directly preceded. When 11 o'clock came without sign of the two ships due from the inner anchorage in Beauly Basin, we in the flagship wondered why. The tide was falling, another half hour passed—would they never come? Signals and radio failed to get through. Very soon, if not already, they would be unable to pass through the new dredged channel. At last, near midnight, they appeared. The pilots had been delayed through a misunderstanding on shore, in itself slight—but it was a narrow escape from being 10 hours late, which, on our first operation, would have made a bad impression, without and within.

The start is made without signals, all dark and noiseless on board, except for the rumbling chain as the ship gets underway. As the *San Francisco* heads out slowly, one after another the signal quartermaster reports the other ships underway and following. We take two-thirds speed now. The full number of lookouts are at their stations and warned to be alert, and the men are now sent to the battery, making a little stir for the moment, then quiet falls again. Fort George shows the signal for an open gate, we increase to standard speed, and as the second ship passes out through the submarine net, they all form single column astern and close up—to 500 yards apart. The rocky shore looms high and black on the left, not a single house light showing. On the offshore side, small patrol craft can be dimly seen, on watch against lurking danger. Fifteen minutes more and we see long, low forms slinking against the dark background of North Sutor. Those are the escort destroyers, going out to form a screen. Close following them we make out larger, higher, moving shadows—our detachment from the other base—one, two, three, four—*five! All there!* The detachments are so timed that they reach the junction buoy at the same moment, and the whole squadron stands on, without pause, together, 10 ships in two parallel columns, 500 yards apart. Ahead and on either side are four destroyers, 12 in all. No signals, no lights, no sound but quiet tones on the

bridge and the swash of the water overside. Three miles along, the water deepens to 60 feet. A screened flash from the flagship to the opposite leader and the squadron, all together, slackens speed, to get out paravanes—those underwater, outrigger-like affairs which guard against anchored mines in one's path. Only a few minutes, then up each column comes the sign "yes," passed by ships in succession—another flash from the flagship, and we resume standard speed again, keeping on, out Moray Firth, through the one-mile wide channel, which is swept daily for mines.



THE MINE SQUADRON AT SEA.
Returning to Base After Laying the Ninth Minefield.

Off Pentland Skerries, near John O'Groat's House, we turn east, and here as we pass, the supporting force files out of Scapa Flow—six light cruisers, then a squadron of battle cruisers and another of four battleships, each squadron screened by six destroyers. Very impressive are these great ships, majestic in movement, as they sweep off to the southward and eastward, disappearing in the morning haze, which magnifies their towering bulk. We see them no more until next day but know they are there, on guard against raiders.

The British Minelaying Squadron is out, too, four ships with a joint capacity of 1300 mines, but we do not meet. Though protected by the same heavy squadrons, we work independently, in different areas. They are bound this time for the section near the Norway coast, Area C it is called, while we are to begin at the southeastern corner of the middle section, Area A, and work to the westward.

Straight over to Udsire we go, a small island off the Norway coast, the nearest good landmark from which to take a departure for the minelaying start point. We make Udsire Light near 11.30 p. m., close in to about 11 miles distance, turn north for a sufficient run to give a good fix, and then head off-shore. Accurate determination of the minefield's position is necessary for use in laying another field close by subsequently, and also for the safety of the vessels sweeping the mines up after the war. There must be steady steaming and steering, with a minimum of changing course—no hesitation, no trial moves, for neither the time at disposal nor the submarine risk will permit.

All goes smoothly until the turn to head off-shore, when one destroyer crosses too close under *San Francisco's* stern and cuts her "taut wire." This is fine piano wire, furnished in spools of 140 miles of wire, the whole weighing one ton. A small weight would anchor the end to the bottom, and then a mile of wire meant a mile over the ground without question.

The wire is soon started again, and as the *Baltimore* is running her wire on the other flank, and the weather is clear enough for good navigational bearings and star sights, no harm is done. We head for a position seven miles in advance of the start point, so that the squadron may turn together to the minelaying course and have still a half-hour in which to settle down.

It is a busy night and early morning, keeping the ships in formation, verifying the navigation, keeping a keen lookout in every direction for submarines—we are now in their regular route—going over the mines for final touches and making other preparations necessarily left to the last. About 4 o'clock, Lieut. Commander Cunningham, the flagship's navigator, reports that we shall reach the start point at 5.27 a. m. Captain Butler and I check his figures, and at 4.27 the signal is made that minelaying will begin in one hour. The crews go to mining stations, to see all clear and then stand by. In the flagship we watch for the

reports of readiness. Ship by ship they signal in the affirmative. They are ready, every one.

Now the last turn has been made and the signal is flying to begin laying in seven minutes. The ships are formed in a single line abreast, speeding towards the start point—like race horses when the starter's flag is up. It is a stirring sight. How will it go, after all these months—for some of us years—of preparation? Our work to-day will mean much to those in Washington.

No ship is off the line by so much as a quarter length. Commander Canaga stands with watch in hand—"two minutes, one minute, thirty seconds, fifteen?" He looks up inquiringly. A nod—all right. "Five seconds—haul down!" Up go the red flags on the first ships to plant, the sign that their minelaying has begun, and word comes from the flagship's launching station at the stern, "First mine over." All well so far.

The minelaying now runs entirely by the time table. Each ship gives her successor five minutes warning and, as her last mine dives overboard, shows the signal "Begin minelaying at once; I have suspended." The successor begins accordingly, showing her red flag. The staff officers on board the *San Francisco* watch for these signals, comparing the times with what they should be, and counting also the seconds elapsed between the launching of successive mines, from the ships whose sterns we can see. A few seconds out now and then—otherwise all goes according to schedule, just as planned before leaving the United States.

The hardest task is on board the *Housatonic*—a new ship, with a new mining installation, of type untried in service, and a crew inexperienced in minelaying—dropping 675 mines without intermission, 1 every 11½ seconds, during 2 hours and 10 minutes. Her mate is standing by, ready for any interruption, but the *Housatonic* completes the task without a break—making a world record, a continuous line of mines, 28 miles long. On a later occasion, the *Canonicus* planted 860 mines in 3 hours 35 minutes, an unbroken line of 43 miles.

About 20 minutes after planting began, an explosion was felt and a geyser seen astern. A few minutes later the same occurred again, and other explosions followed, at varying intervals and distances, some just visible on the horizon. Others which were nearer, as evidenced by the sharpness of the shock, threw up no geyser, indicating that they were at the middle or lowest depth.

In the proof tests held off Cape Ann in April, it had been observed that a mine at the middle level, 160 feet submergence, made no surface disturbance when detonated, until 8 seconds had elapsed, and then only as much as the wash of a light swell over a submerged rock. At the deepest level, 240 feet submergence, a detonation produced no more surface upheaval than there is in a glass of well iced champagne. The ship being about 800 yards away, the shock was heavy and sharp. The water surface all over could be seen to tremble with the shock, but directly over the mine itself, when, after 27 seconds, the gas came up, there was no more surface disturbance than a pleasure canoe could have ridden with safety. A slick on the water would follow, but this could not be distinguished at much over a mile distance nor at all if there were a white cap sea running.

Observers recorded the number, times, and approximate positions of all explosions and, on board the *San Francisco* and *Baltimore,* there were listeners stationed at the submarine signal receivers, so as to get a full count. All observers did not agree, as the indications from sounds and shocks varied according to distance and depth. Some explosions gave a prolonged reverberation, at times sounding to the unassisted ear like two or three explosions in rapid succession, but in the submarine signal receiver each explosion made a distinct sound, unmistakable.

The count by the *San Francisco* and *Baltimore,* differing by only 2, practically agreed on 100 explosions, or about 3 per cent of all mines planted. Although a perfect record was desirable, the detonations showed the minefield to be alive and sensitive, and their number was not large for a new mine, not yet long enough in service to refine out the minor defects.

Surprising enough on deck, where one could see, that first explosion must have startled the men in the engine room, in the coal bunkers, and on the lower mine decks. The blow rings sharper down there, where resulting damage, in broken pipe joints or started boiler tubes, might be expected first. Whether gun, torpedo, or mine, however, it is all one—the duties go on just the same.

As the mines on the launching deck move slowly aft, those on lower decks move forward, to the elevators and up. Working spaces are cramped, passages narrow, bulkhead doors closed wherever possible. At the right time, a door will be opened, the

portable section of mine track adjusted, the mines in that compartment hauled out, and the door closed again water-tight, all as quickly as possible. Close, hot, foul with oily steam and seasickness—it is sweating, disagreeable work below decks. But complaint is nowhere in the ships. The feeling is well expressed by one man, writing home:

When the first mine went over, I had a curious feeling of exultation. The fear, the perils, the uncertainties that surround our work, slipped from me like the foolish fancies of a nightmare. There, at last, was a nail in the Kaiser's coffin. Come what might, I had justified my existence. Had the whole German High Seas Fleet appeared in the offing, I am sure I should have gone to my battle station with a shout of glee.

Prolonged activity, in preparing the squadron and bringing it out, makes it trying now for me, to look on, hands folded—nothing to do while everything goes well—yet constantly alert, for instant decision in case of mishap. After nearly four hours, the schedule is finished. Some marker buoys are dropped, for later use in beginning another minefield. The line of ships then takes the narrower route formation, and we head back for the base. Butler, Canaga, and I exchange quiet congratulations. Our work together has been to good purpose.

The men clean up the decks, get a wash for themselves, and those off duty drop asleep—anywhere—the deck is covered with them. On top of the duties common to all men-of-war, to move the 400-ton masses of mines, in slow but steady time, is very fatiguing, even with steam winches to help.

We are not finished yet. Expectation of a quiet afternoon doze, handy to the bridge, is rudely dispelled by a smoke screen started by the destroyers. Unaware it is only an exercise, all hands tumble up to battle stations. Then one minelayer must stop, to tighten a nut working loose. Two destroyers are left to guard her, all three overtaking us in a few hours. Next a dirigible balloon heaves in sight, and then a widespread smoke covers the horizon, developing into a convoy of 50 vessels. Finally, in the midst of dinner, the siren of our next astern shrieks "Submarine to port!"

While the minelayers, upon signal, swing together away from the danger quarter, the *Vampire* swoops by at 30 knots, to drop two depth charges on the spot indicated. Captain Godfrey signals, "Whatever was there, those charges will keep him down for a

considerable time." All quiet again, we return to our cold provender, remarking that, as a name, mine squadron is ill chosen. It should be " Crowded Hour Club."

Reports had now come in from all the ships that there had been no casualties. All were prepared to undertake another operation upon receiving the mines, and without further incident we returned to our former anchorages, arriving at 3.30 next morning. But ere that day closed, so memorable in our lives, I signaled the squadron:

The operation to-day was an excellent performance by each ship and by the squadron as a whole. The fact of some premature explosions does not detract from the highly creditable mine handling and steady steaming. Confidence in the personnel and faith in the undertaking are well justified, and captains may well be proud of their commands, as the squadron commander is of the squadron.

SQUADRON ORGANIZATION AND SHIPS' DATA

MINE SQUADRON ONE, U. S. ATLANTIC FLEET

(Designated in H. B. M. Grand Fleet, SECOND MINELAYING SQUADRON)

Captain Reginald R. Belknap, U. S. N., Squadron Commander

Flagship—U. S. S. *San Francisco*

Chief of staff.....*Captain H. V. Butler.
Aid and tactical officer..... Commander B. L. Canaga.
Squadron construction and mining officer .....*Comdr. L. F. Kimball.
Squadron engineer .....*Lt. Comdr. F. R. Berg.
Squadron engineer from 1 October, 1918 .....*Lieut. G. J. Blessing.
Flag lieutenant and secretary..... Lt. Comdr. E. S. R. Brandt.
Aid and secretary after 23 August, 1918 ..... Ensign Roger F. Hooper, R. F.
Squadron radio officer, also signal officer after 23 August, 1918.... Lieut. R. C. Starkey.
Communication officer and aid..... Lt. (j. g.) R. L. White, R. F.
Squadron surgeon .....*Lt. Comdr. G. C. Rhoades (M. C.).
Squadron surgeon from 1 October, 1918 .....*Lieut. H. P. Stevens (M. C.), R. F.
Squadron supply officer.....*Lieut. C. R. Eagle (P. C.).
Squadron athletic officer.....*Lt. Comdr. G. W. Hewlett.
Assistant squadron construction officer .....*Lieut. G. R. Arey (C. C.).

San Francisco (flagship)—Captain H. V. Butler, U. S. N.

Launched at Union Iron Works, San Francisco, October 26, 1889, as a protected cruiser; commissioned as a mine ship August 21, 1911; length 324 feet, beam 49 feet, extreme draft 24 feet, full load displacement 4583 tons; twin screw, 18 knots; four 5-inch 51-caliber guns, two 3-inch anti-aircraft guns, 170 mines; officers 22, crew 350; additional for flagship, officers 5, enlisted men 47; total on board 424.

Baltimore—Captain A. W. Marshall, U. S. N.

Launched at Cramp's Shipyard, Philadelphia, October 26, 1888, as a protected cruiser; commissioned as a mine ship March 8, 1915; length

* Additional to ship duties.

335 feet, beam 48½ feet, extreme draft 24 feet, 5482 tons; twin screw, 18 knots; four 5-inch 51-caliber guns, two 3-inch anti-aircraft guns, 180 mines; officers 21, crew 339; total 360.

Roanoke—Captain C. D. Stearns, U. S. N.

Launched August 30, 1911, named *El Dia;* commissioned as a minelayer January 25, 1918, at Tietjen and Lang's Shipyard, Hoboken, N. J.

Housatonic—Captain J. W. Greenslade, U. S. N.

Launched November 14, 1899, named *El Rio;* commissioned January 25, 1918, at Tietjen and Lang's.

Canandaigua—Captain W. H. Reynolds, U. S. N.

Launched in May, 1901, named *El Siglo;* commissioned March 2, 1918, at the Morse Dry Dock and Repair Company, Brooklyn, N. Y.

Canonicus—Captain T. L. Johnson, U. S. N.

Launched November 14, 1899, named *El Cid;* commissioned March 2, 1918, at the Morse Yard.

All four preceding were built at the Newport News Ship and Engine Building Company, Newport News, Va., as freight liners for the Southern Pacific Steamship Company (Morgan Line). Length 405 feet, beam 48 feet, draft 20 feet, displacement 7000 tons; single screw, 15 knots; one 5-inch 51-caliber gun aft, two 3-inch anti-aircraft guns forward; 830 mines normally, 900 maximum, carried on three decks; officers 21, crew 400; total 421.

Quinnebaug—Commander D. Pratt Mannix, U. S. N.

Launched October 14, 1898, named *Jefferson;* commissioned as minelayer March 23, 1918, at Robins' Dry Dock and Repair Company, Brooklyn, N. Y.

Saranac—Captain Sinclair Gannon, U. S. N.

Launched in 1899, named *Hamilton;* commissioned April 9, 1918, at James Shewan & Sons, Inc., Brooklyn.

Both were built by John Roach & Sons, Chester, Pa., as coast-wise passenger and freight liners for the Old Dominion Steamship Company; length 375 feet, beam 42 feet, draft 18½ feet, displacement 5150 tons; single screw, 16 knots; one 5-inch 51-caliber gun aft, two 3-inch anti-aircraft guns forward; mines 612 normally, 642 maximum, carried on two decks; officers 18, crew 392; total 410.

Shawmut—Captain W. T. Cluverius, U. S. N.

Aroostook—Captain J. Harvey Tomb, U. S. N.

Both vessels were launched in 1907 at Cramp's Shipyard, Philadelphia, named *Massachusetts* and *Bunker Hill* respectively; commissioned as minelayers at Navy Yard, Boston, Mass., December 7, 1917; length 387 feet, beam 52 feet, draft 17½ feet, displacement 3800 tons; twin screw, oil fuel, 20 knots; one 5-inch 51-caliber and one 3-inch anti-aircraft gun on the middle line aft, one 3-inch anti-aircraft gun forward; 320 mines normally, 352 maximum, all carried on one deck; officers 20, crew 346; total 366.

Totals of Squadron:

Tonnage, 54,000 tons.

Mines, normal 5530, maximum 5834.

Officers 208, men 3839; total 4047.

In addition, four sea-going tugs belonged to the squadron, as described in Chapter 22.

(TO BE CONTINUED)

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE ALLEGATION OF SNOBBISHNESS—OUR RESPONSIBILITY—AND SUGGESTIONS TENDING TOWARD ITS ERADICATION

By COMMANDER B. B. WYGANT, U. S. Navy

There exists in this country a distinct prejudice on the part of some people against naval officers, particularly graduates of the Naval Academy, on account of a snobbishness that is alleged to obtain among them. This feeling is shown in speeches made in Congress, and in articles that appear now and then in various periodicals. These speeches and written articles are generally by men whose facilities for observation are limited and who have drawn their conclusions by applying their own experience and feelings to conditions that can only be superficially understood by those who have not, at first hand, seen the necessity for discipline and its forms.

This feeling is rather more widespread than most of us realize, as is shown by the reception accorded its expression, and by the character and circulation of the periodicals in which the articles appear. It cannot fail to do the service injury if something is not done to counteract it. Although it would unquestionably practically disappear if we had universal service, we have not as yet, and we must face present facts and not concern ourselves with hypotheses.

The fact is that the idea of snobbishness among naval officers exists; that it is fairly widespread among the uninformed; that it is being constantly spread with no very effective attempt at contradiction; and that it lessens the esteem in which the service is held by the country at large.

As regards an idea, it matters little in the effect produced whether or not it be correct: far too often it is what things seem to be that counts, and not what they are. Therefore, if we seem to have this defect, as far as those are concerned who see it in us we *have* it, and it behooves us to correct whatever shortcom-

ings do exist, and to remove the false impression by every effort in so far as it is false.

Let us in the first place critically examine ourselves and our acts and ascertain if there is any proper foundation for this belief. It was a matter of surprise and somewhat of a shock to find out, after frankly interrogating several reserve officers, that many of them had gained the impression that officers of the regular service are snobbish, particularly (did they say) recent graduates of the Naval Academy. Further questioning usually elicited the fact that this impression could be traced to one of two causes: Failure on the part of the individual to adapt himself to military methods, or tactlessness on the part of naval officers with whom he had come in contact. It appeared that young officers who had had the four months' course at the Naval Academy fitted more easily into naval life, and consequently did not feel the irritation caused by the exactions of discipline, experienced by those who had not had the benefit of this training.

If this be a correct deduction it is enlightening in that it shows the necessity for inculcating a strict sense of discipline before an officer (or an enlisted man for that matter) is thrown into the intimate contact of service afloat.

Of course there are those whose home training has instilled the respect for authority that is so much a part of our naval life, but unfortunately this is not universal.

Tactlessness on the part of those in authority is a prolific source of irritation with its consequent harmful results Take the case of an admonition, a reprimand or the refusal of a request that leaves a needless sense of resentment. It does harm, for resentment is like sand in the gears, it impedes progress.

To these two things, ignorance of the requirements of discipline, and tactlessness on the part of seniors, is to be attributed in part this more or less widespread attitude of disapproval on the part of many people.

Let us be perfectly honest with ourselves and realize that whatever is wrong with the navy, is, except where influenced from outside sources or where compromise is forced upon us, the fault of the navy, and that means naval officers.

Our best advocates should be those who have been in the service and leave it to enter civil life, and those civilians who come into intimate contact with the navy in business or otherwise.

What, then, can be done to remedy the state of affairs, considering the two main causes of friction, and the fact that it lies within our means to eliminate them to a large extent?

First, let us be more careful in the training of officers and men to inculcate the right ideas. Pains should be taken carefully to explain the necessity for prompt obedience, respect for authority and cleanliness and neatness of person. This instruction should not cease with the training station period. For example liberty parties should have it continually brought before them on leaving the ship that they represent the navy and their own ship, and that their actions reflect credit or discredit as the case may be. This also infers a careful inspection as to uniform and the wearing of the proper cap ribbon. Division officers should constantly instruct their men in the meaning of the salute. I have spoken to many men regarding failure to salute when on shore and their answers usually divide them into classes—those who honestly were not aware of my presence and those who tried to "get away with it" through an aversion to saluting. In nearly all cases of the second type proper instruction would have prevented the infraction. If men could only be taught the proper meaning of the salute—and they can be—it would be a matter of pride to salute.

To be more specific: The psychology of the salute should be better studied, by officers and men. Make it understood that a junior meeting a senior in effect says to himself: "There is one, my senior in this honorable profession to which we both belong. I am proud to salute the uniform he wears for it represents the authority I am pledged to obey—the expression of the will of my country. In saluting I am publicly acknowledging my allegiance to my flag." The senior in returning the salute says: "There is one who belongs to the same honorable profession as myself. He is saluting the uniform I wear on account of what it means. As the wearer of that uniform I am proud to return the salute, and in doing so acknowledge his loyalty as thus expressed, and publicly proclaim our common allegiance."

Let us get rid of the hang-dog look that so often accompanies the salute, and do away with the careless and sloppy return of the salute by those who do not understand its significance.

These things cannot be done in a short time, they require unceasing attention and constant reiteration. They presuppose a

pride in the service and an *esprit de corps* that it should be the ambition of every officer to foster and maintain.

In the navy personal relations transcend in importance everything else. These relations affect honor, obedience, loyalty—all the qualities that make the difference between victory and defeat. The most powerful guns, the most efficient machinery, the most complete knowledge of strategy and tactics are helpless without the exercise of these qualities. Personal relations are largely dependent on tact—yet how little is this subject considered in the training of officers!

In this discussion it is important that it be quite clear what is meant by tact. For present purposes let us define it as "the ability to deal with others without giving needless offense." It does not necesarily mean saying "please" and "thank you," but it does have to do with the expression of the countenance and the tone of the voice, and above all it requires self-control.

The avoidance of the causes of resentment also requires standardization of methods. In other words tactful administration of discipline implies a standard that is universal throughout the service.

We must all require the highest standard; of conduct, of courtesy, and of appearance.

To consider the official relations of seniors and juniors: There are times of course when it is desirable for the senior to "get mad," but they are rare and each time that it happens its effect is lessened. Have we not—most of us—seen cases where this tendency became undignified and even ludicrous? The same applies to a loud tone of voice when calling attention to an error or administering a reprimand. There are times when a loud tone of voice is necessary, but how much more effective is obvious repression in most instances. I have in mind a certain naval officer who habitually was very quiet when officer of the deck on a sailing ship, but when he did "let out" we midshipmen jumped, and lively, too. There was no mistaking the urgency of his orders.

So with harshness in judging errors due to ignorance or incompetence. If a man doesn't know he should be instructed; if he isn't capable of performing his duties he should be reduced or discharged. That is, in these cases no fault can be justly attributed to the man himself—the fault lay with those who failed to

instruct on the one hand or with those who neglected to ascertain his incapacity on the other.

Paul Jones in his admirable letter emphasized the importance of tact and forbearance.

If there be any foundation in fact for the attitude of those who hold us in disesteem, a thoughtful consideration of the ideas outlined above, and an effort to eliminate whatever needs elimination and to encourage improvement along these lines should tend to remove any just causes of criticism.

It then remains for those of us who have the opportunity to combat by word and example the pernicious misinterpretation to which we have been and are being subjected.

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A DESCRIPTION OF THE BATTLE OF JUTLAND

(CONTINUED)

By LIEUT. COMMANDER HOLLOWAY H. FROST, U. S. Navy

VIII. THE BATTLE CRUISER ACTION. MOVE 4. 3.48 TO 4.08 P. M. POSITION 4

At 3.48 the British and German battle cruisers opened fire simultaneously. According to Beatty's report the range was 18,500 yards. The Germans reported an opening range of 13,000 meters. The British report is assumed to be correct. As soon as fire was opened Beatty went ships right simultaneously about 30° and steadied on a course which was probably about 150° true.

At 3.51, only three minutes after fire had been opened, the *Lion* was hit by two shells; by 4 p. m. the *Tiger* and *Princess Royal* had also been hit by several shells. The *Lion* received several more hits and at 4 p. m. the roof of one of her turrets was blown off. The German fire was extremely rapid and accurate, and, the range having decreased by 4 p. m. to 16,000 yards, was having great effect on the British ships. In order to confuse the German fire control the course was altered slightly to the southward at this time.

At 4.06 several projectiles of a salvo hit the *Indefatigable* at the outer edge of the upper deck in line with the after turret. A magazine exploded and the *Indefatigable* fell out of column, sinking by the stern. Another salvo hit her forward and she turned over and sank.

The British fire was also accurate and a number of hits were scored. It is believed, however, that no turret guns were placed out of action or appreciable damage caused.

At about 4.08 the British destroyer *Landrail,* which was on the port beam of the *Lion,* trying to gain her position ahead, sighted the periscope of a submarine. The *Nottingham,* of the second light cruiser squadron, also sighted a periscope.

At about 3.48 the first and third light cruiser squadrons, having concentrated from their positions in the screen, took station astern of the fifth battle squadron.

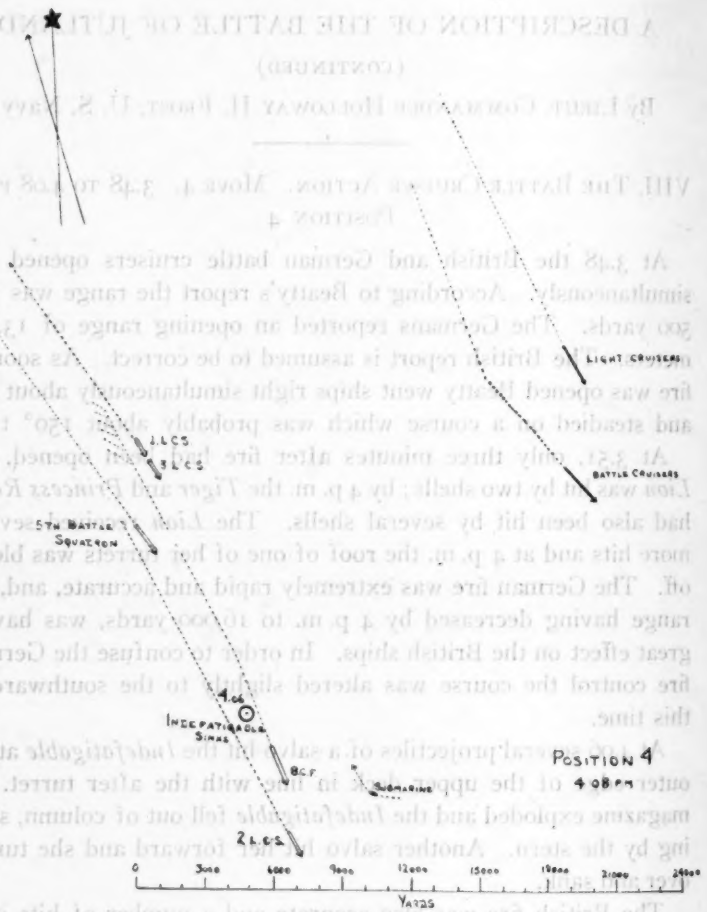

FIG. 8.

At 4 p. m. Admiral Jellicoe directed the third battle cruiser squadron to reinforce Beatty. By this time the speed of the battle fleet had reached 20 knots.

IX. The Destroyer Action. Move 5. 4.08 to 4.30 p. m.

Position 5

The action between the battle cruisers continued at gradually increasing ranges. You will remember that at 4 p. m. the British battle cruisers had changed course slightly away from the enemy; the Germans must have also changed course away at this time. Admiral Jellicoe states that the range, which had been 16,000 yards at 4 p. m., had increased to 23,000 at 4.12. By his own sketch, however, it is only 18,000 yards and I assume this distance to be correct, especially as it agrees with the official report of Admiral Beatty. In order to close the enemy, Beatty changed course to 135° true.

At 4.08 the fifth battle squadron opened fire at a range of about 19,500 yards. Only two of the German battle cruisers were visible from the vessels of this squadron, due partly to the decreasing visibility and to the smoke made by the battle cruiser fleet and other vessels ahead. The Germans also frequently laid smoke screens and zigzagged to disturb the British fire control.

At about 4.12 torpedoes were seen passing through the line of the British battle cruisers; they were probably fired by the submarines sighted by the *Landrail* and *Nottingham*. One torpedo passed under the *Princess Royal*.

By this time a number of British destroyers had assembled ahead of the battle cruiser fleet and had been given general instructions by Admiral Beatty to attack when a favorable opportunity occurred. Therefore at 4.15 the following destroyers moved out to attack:

Thirteenth Flotilla:

Nestor, Commander the Honorable E. B. S. Bingham.
Nomad, Lieut. Commander Paul Whitfield.
Nicator, Lieutenant J. E. A. Mocatta.
Narborough, Lieut. Commander Geoffrey Corlett.
Pelican, Lieut. Commander Kenneth A. Beattie.
Obdurate, Lieut. Commander Cecil H. H. Sams.
Petard, Lieut. Commander Evelyn C. O. Thompson
Nerissa, Lieut. Commander Montague C. B. Legge.

Tenth Flotilla:

Moorsom, Commander John C. Hodgson.
Morris, Lieut. Commander Edward S. Graham.

Ninth Flotilla:

Turbulent, Lieut. Commander Dudley Stuart.
Termagant, Lieut. Commander Cuthbert P. Blake.

At the same time that the British destroyers commenced their advance, Hipper, in an attempt to reduce the great superiority of the British since the fifth battle squadron had entered the fight, ordered his destroyers to attack. Accordingly, 15 destroyers ac-

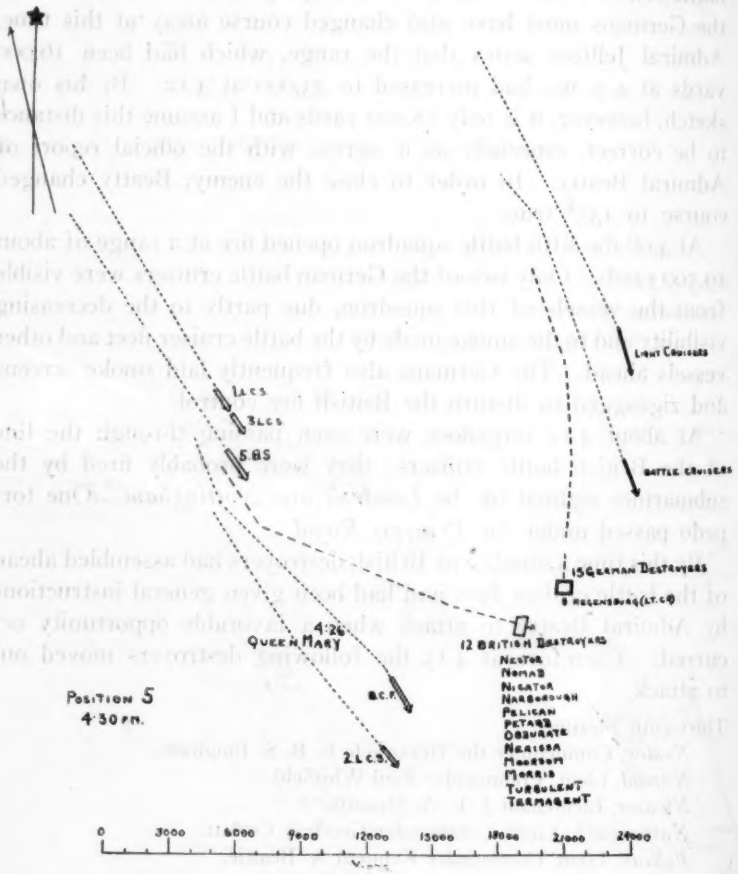

FIG. 9.

companied by the light cruiser *Regensburg* advanced against the British battle cruisers. At 4.30 the opposing destroyers met between the lines and a desperate engagement at several hundred yards' range commenced.

Meanwhile, the change of course of the battle cruiser fleet to southeast had again decreased the range at which the battle cruiser

action was being fought. By 4.18 the range was about 17,000 yards between the battle cruisers and about 19,000 yards between the German battle cruisers and the fifth battle squadron. The action now became very fierce and the fire of both British and German ships was extremely effective.

At 4.18 a fire was noticed on the *Seydlitz,* the third ship in the German column.

At 4.23 the *Barham,* flagship of the fifth battle squadron, received her first hit.

At 4.26 a salvo hit the *Queen Mary* abreast of "Q" turret; a magazine exploded and the ship was completely destroyed; a great amount of wreckage fell upon the decks of the *Tiger,* the next ship in formation. A few of the crew of the *Queen Mary* and of the *Indefatigable* were saved by the British destroyers. Admiral Jellicoe was not informed of the loss of either of these ships until the following morning.

X. The German Main Body Appears. Move 6. 4.30 to 4.45 P. M. Position 6

At 4.30 a most desperate engagement was being fought between 12 British destroyers and 15 German destroyers and one light cruiser. The British destroyer *Petard* fired a torpedo at the leader of a group of three Geman destroyers, hitting and sinking her. Another German destroyer was sunk by gunfire. As the British battle cruisers were well in advance of the German battle cruisers, and as the destroyers on each side may be assumed to have been about the same distance ahead of their own battle cruisers, it will be seen that the British boats had a much better opportunity for making a successful torpedo attack than did the German boats. Therefore, as the British battle cruisers were too far ahead to allow an effective attack on them by the German destroyers, these boats had to be content to fire at the fifth battle squadron. This squadron turned away to avoid the attack, two torpedoes passing through the line without effect.

The German destroyers were forced to retreat before the advance of the British destroyers before their torpedo fire could have any effect other than to delay somewhat the advance of the fifth battle squadron. However, they had to a great extent broken up the attack of the British destroyers, which had been launched from a very favorable position.

Four British destroyers, *Narborough, Pelican, Obdurate* and *Morris,* had fallen so far to the rear that they were unable to fire any torpedoes.

Three destroyers, *Nestor, Nomad* and *Nicator,* were unable to attack from a favorable position on the bow and therefore pushed

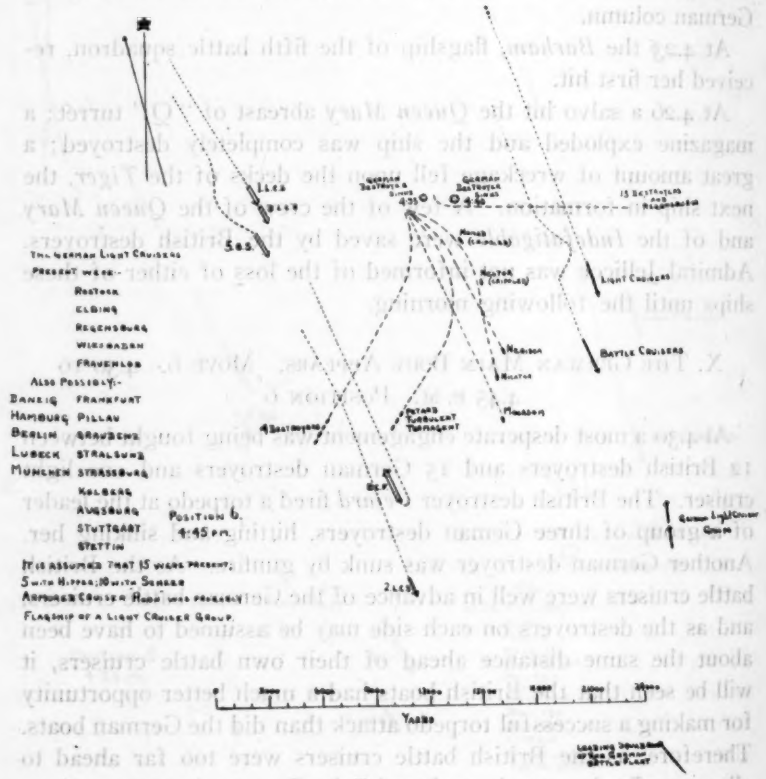

FIG. 10.

home an attack from on the beam of the battle cruisers, which turned away and covered the destroyers with a heavy fire from their secondary batteries. The *Nomad* was crippled by this fire before reaching torpedo range, left the column and lay dead in the water. *Nicator* and *Nestor* fired torpedoes at the battle cruisers at a range of 6000 yards. *Nestor* was then crippled by the fire of a light cruiser, probably the *Regensburg,* and remained dead in the water. *Nicator* rejoined her flotilla.

The *Petard, Turbulent* and *Termagant* also pushed home their attack and each fired a torpedo at the German battle cruisers at a range of 7000 yards.

The remaining two destroyers, *Moorsom* and *Nerissa,* were unable to fire any torpedoes at this time, but continued on to the southward.

During the destroyer attacks the engagement between the heavy ships had been continuing with great fierceness. The effectiveness of the fire, however, had been somewhat reduced by the decrease in the visibility, the smoke of the destroyers between the lines and the fact that the fifth battle squadron and the German battle cruisers had been compelled to maneuver to avoid torpedoes. The German battle cruisers had been forced to use their secondary batteries for a time against the British destroyers led by the *Nestor* and this must have interfered with the fire of their turret guns.

Of the five torpedoes fired by the British destroyers during this period three passed close to the *Moltke* and it is believed that one hit the *Seydlitz,* as this ship, according to a German account published since the armistice, is said to have been hit "at the very beginning of the action." This ship was apparently very little damaged, due to the excellent protective arrangements of the Germans, and continued in the formation throughout the action.

At 4.38 Commodore Goodenough, commanding the second light cruiser squadron, which was ahead of the battle cruiser fleet, reported that he had sighted the German battle fleet bearing south-east (135°) true and steering to the northward at high speed.

Admiral Beatty recalled his destroyers. At 4.42 he himself sighted the enemy and turned his four remaining battle cruisers in succession through 180° to the right and proceeded to the northward "to lead them towards the battle fleet," which was then distant a little over 50 miles.

The second light cruiser squadron kept on to the southward to obtain information of the German battle fleet.

The fifth battle squadron and the German battle cruisers continued for the present in their courses and continued the action.

The accounts of the British destroyer attacks at this time vary greatly. I have accepted as correct Admiral Jellicoe's book, as this is the latest and therefore probably the most reliable authority. Other accounts have been used to supply additional details.

XI. THE GERMAN BATTLE FLEET ENTERS THE ACTION. MOVE 7. 4.45 TO 5 P. M. POSITION 7

At about 4.45 the leading squadron of the German battle fleet opened a heavy fire on the second light cruiser squadron at the short range of 13,000 yards. Commodore Goodenough turned to the

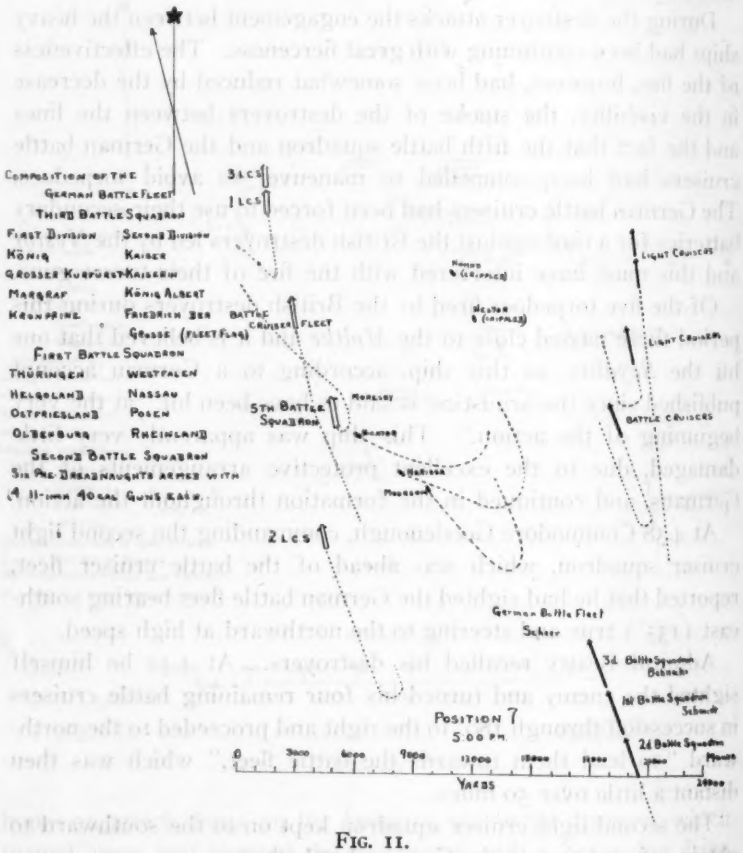

FIG. II.

northward and continued sending his reports of the German forces to Beatty and Admiral Jellicoe. His escape without being hit by a single shell seems remarkable and seems to show that the gunnery of the German battleships was less accurate than that of their battle cruisers, a fact which will be demonstrated several times during the day.

At 4.52 Hipper turned his five battle cruisers in succession 180° to the left—away from the enemy—and steadied on a northerly course, continuing his action with the fifth battle squadron, which still kept on to the southward.

At 4.57, in accordance with instructions from Beatty, the fifth battle squadron turned in succession through 180° to the right and steadied on a northerly course. This squadron came under the fire of the leading ships of the battle fleet, but at such long range that probably no hits were scored.

The *Nerissa,* which with the *Moorsom* had been unable to attack the German battle cruisers and had been proceeding to the southward, now moved toward the battle cruisers which were on a northerly course. Two torpedoes were fired at a range of about 7000 yards. *Moorsom* fired four torpedoes at the second and third ships in the German battle fleet at ranges of about 8500 yards. *Nottingham* of the second light cruiser squadron fired one torpedo at the extreme range of 16,500 yards.

The first and third light cruiser squadrons, and the *Fearless* with the destroyers of the first flotilla, which had just been concentrated, took position ahead of the battle cruiser fleet. The *Champion* with the destroyers of the 13th flotilla took station near the fifth battle squadron.

As soon as the German battle cruisers turned to the northward the second scouting group of light cruisers which had been following them to the southward also countermarched and took position ahead of Hipper. They were joined here by two additional scouting groups, probably the third and fourth, which had arrived with the German battle fleet. Several flotillas of destroyers accompanied the light cruisers, while the remaining flotillas proceeded with the battle fleet. Vice Admiral Scheer took command of all the German forces.

XII. The Run to the North. Move 8. 5 to 5.35 P. M.
Position 8

All the British and German forces continued to the northward. The first and third light cruiser squadrons and the destroyers of the first flotilla led the British formation. Then came the battle cruiser fleet of four ships which held the five German battle cruisers at a range of about 14,000 yards. Next came the fifth

battle squadron; the two leading ships, *Barham* and *Valiant*, assisted the battle cruiser fleet by engaging the German battle cruisers at the same range; the two rear ships, *Warspite* and *Malaya*, engaged the leading German battleships "as long as their guns would bear" at the very long range of 19,000 yards.

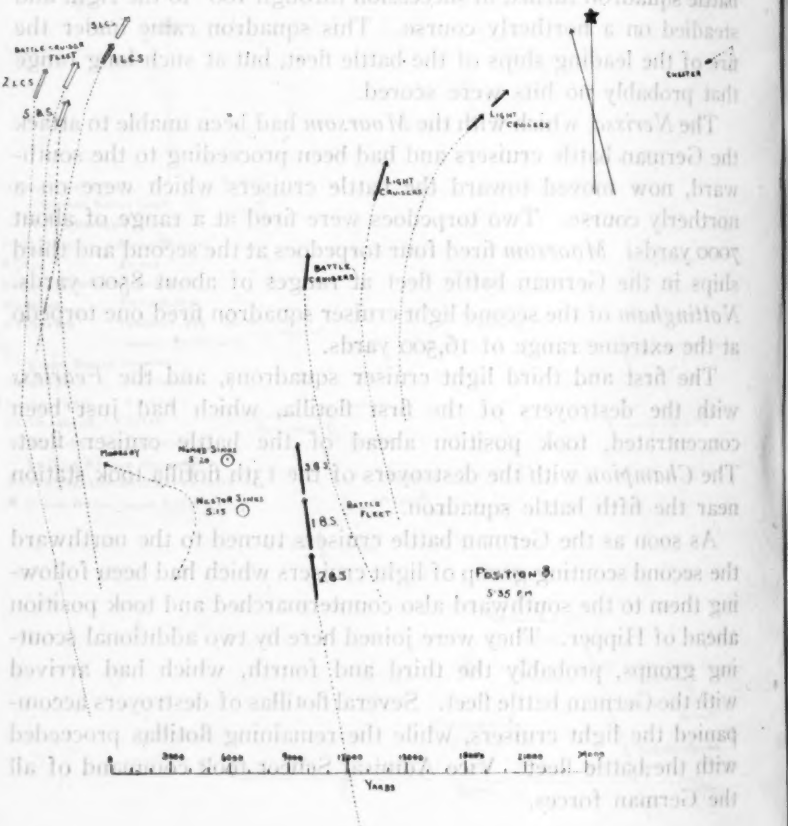

FIG. 12.

The destroyers of the 13th flotilla accompanied the fifth battle squadron and the second light cruiser squadron brought up the rear of the line.

The German line was headed by three scouting groups of light cruisers and several flotillas of destroyers, all of which forces were sufficiently to the eastward to be out of range of the British

ships. Well on the port quarter of the light cruisers were the German battle cruisers which engaged the British battle cruisers and the fifth battle squadron. The German battle fleet followed the battle cruisers at a considerable interval. The third battle squadron apparently made 23 knots for a time as the fifth battle squadron, which was making 25 knots, was able to draw away only very slowly. The leading battleships fired a few shots from time to time at the British battleships.

The visibility conditions became worse and favored the Germans. At 5.12 the German battle cruisers, although only distant 14,000 yards, were invisible to Beatty and the battle cruiser fleet ceased firing until about 5.40.

The ships at the head of the British line gradually altered course to the eastward, conforming to the reported position of the British battle fleet. The German ships also altered course to the eastward to prevent the enemy from gaining a favorable position on the bow.

At 5.10 the *Lion* fired two torpedoes at the German battle cruisers; at the same time the destroyer *Moresby* fired a torpedo from a position on the starboard bow of the *Lion* at the battle cruiser column at a range of about 7000 yards.

At about 5.15 the German battle fleet came up to the crippled destroyers *Nestor* and *Nomad*. Both were sunk, but only after they had fired all their torpedoes. It is pleasing to note that Commander E. B. S. Bingham of the *Nestor* was taken prisoner by the Germans and was awarded the Victoria Cross.

At 5 p. m. Admiral Hood with the third battle cruiser squadron and the accompanying light cruisers and destroyers were in the following formation:

Invincible (flag).
Inflexible.
Indomitable.
} In column formation.

Destroyers *Shark, Christopher, Ophelia* and *Acasta* formed ahead in a submarine screen.

The light cruiser *Canterbury* five miles ahead.

The light cruiser *Chester* bearing 276° true, distant probably about five miles.

All these forces were on course 184° true making 25 knots.

At 5.30 gunfire was heard to the southwest and the *Chester* headed in that direction to investigate.

At 5 p. m. the battle fleet was in position Latitude 57° 24′ N., Longitude 5° 12′ E. The course was 132° true and the speed 20. The scouting line of the first and second cruiser squadrons was about 16 miles in advance of the battle fleet, steering the same course and making the same speed. They were spaced at intervals of six miles on the line.

XIII. THE BRITISH MAIN BODY COMES ON THE SCENE. MOVE 9. 5.35 TO 5.55 P. M. POSITION 9

The British forces under the command of Admiral Beatty continued to the northward, gradually changing course to the eastward

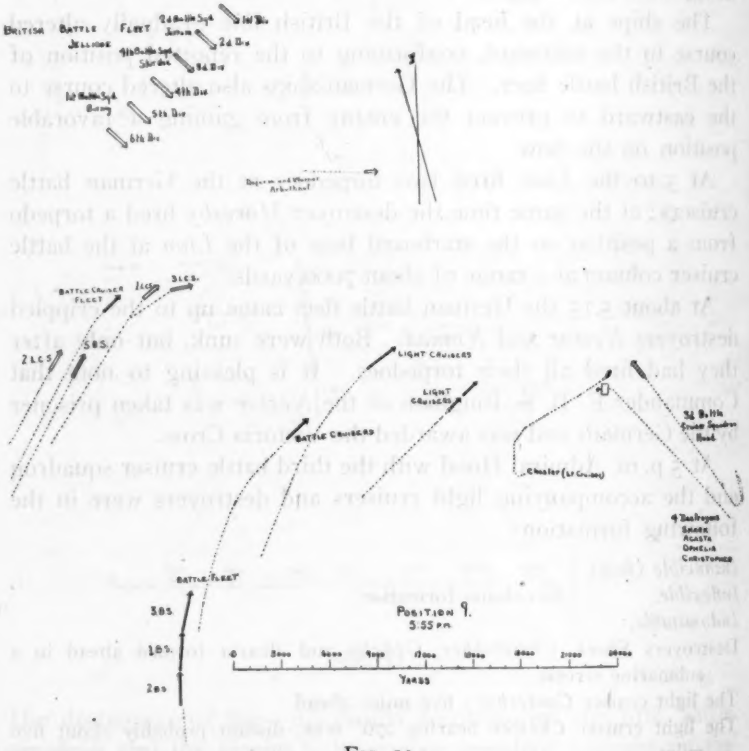

FIG. 13.

so that at 5.55 the course was about 45° true. The range from the British battle cruisers to the German battle cruisers was about 14,000 yards. At 5.40 Beatty reopened fire; this was very effective

between 5.42 and 5.52, the *Lion* firing 15 salvos. The fifth battle squadron fired at the same range at the German battle cruisers, being by this time well out of range of the German battle fleet.

The German forces conformed to the movements of the enemy in turning to the eastward, so that at 5.55 the battle cruisers were probably steering about 45° true. The German light cruiser groups were well in advance and beyond supporting distance of their battle cruisers. They were accompanied by several flotillas of destroyers.

At 5.36 the *Chester,* attached to the third battle squadron, sighted a three-stacked German light cruiser on her starboard bow, accompanied by one or two destroyers. The *Chester* changed course to west to close, but observing a destroyer in a favorable position for attacking her with torpedoes, headed north to avoid the attack, bringing the enemy cruiser abaft the port beam. The two light cruisers opened fire on each other at a range of 6000 yards. Soon two or three additional light cruisers were sighted by the *Chester* astern of the first; these vessels did not open fire immediately.

The fourth salvo of the German light cruiser hit the *Chester,* putting one gun out of commission and wounding many of the crews of two other guns. The *Chester* now altered course to the northeast to receive assistance from the British battle cruisers. As she changed course the remaining enemy vessels opened fire, inflicting serious injuries and killing or wounding a total of 81 men.

At 5.40 gunfire was seen by the third battle cruiser squadron. Admiral Hood changed course to starboard and headed to the northwest, bringing the enemy light cruisers on his port bow. At 5.55 he was steering about 325° true and opening fire on the light cruisers at a range of about 11,000 yards. The four destroyers in company with him were standing in to make a torpedo attack, led by the *Shark,* Commander Loftus Jones.

At 5.40 firing was heard ahead by the first and second cruiser squadrons. Soon afterward ships were seen emerging from the mist. Rear Admiral Heath ordered the second cruiser squadron to concentrate on the *Minotaur.* He then made the signal to engage the vessels sighted, but very fortunately they were made out to be the third battle cruiser squadron before fire was opened.

At 5.47 the *Defense,* flagship of Sir Robert Arbuthnot, with the *Warrior* in column astern of her, sighted four German light

cruisers bearing 177° true. These light cruisers evidently formed the third of the scouting groups, two of them being engaged with the third battle cruiser squadron at this time. The *Defense* changed course 34° to port and each ship fired three salvos at a German light cruiser. The shells fell short and the *Defense* then headed directly for the German ships, the *Warrior* following.

The battle fleet continued on its course of 132° true at the speed of 20 knots. A little after 5.40 a report was received from the *Black Prince,* the westernmost ship in the scouting line, that battle cruisers were in sight, bearing 166° true, distant five miles. At 5.45 the *Comus* of the fourth light cruiser squadron, which was spread three miles ahead of the battle fleet, reported that heavy gunfire could be seen bearing 166° and 188°. At 5.50 Sir Robert Arbuthnot reported ships bearing 188° true and heading 31° true. At 5.55 Admiral Jellicoe made a signal to Sir Cecil Burney, who led in the *Marlborough* the starboard wing division, asking what he could see.

XIV. ENGAGEMENTS BETWEEN THE LIGHT FORCES. MOVE 10. 5.55 TO 6.10 P. M. POSITION 10

At 5.56 Beatty sighted the leading battleships of the battle fleet (*Marlborough*) bearing 346° true, distant five miles. In order to take up a position to the eastward of the battle fleet, he immediately changed course to 76° true and proceeded at utmost speed. This decreased the range of the German battle cruisers to about 12,000 yards. The action between the opposing battle cruisers seems to have been very light at this time. The fifth battle squadron continued after the battle cruiser fleet and were fairly heavily engaged with the German battle cruisers.

When the third battle cruiser squadron opened fire at 5.55 on the German light cruisers which had been pursuing the *Chester,* they fired torpedoes and quickly turned away. At 6.10 nine torpedoes were seen approaching; the *Invincible* and *Indomitable* turned to starboard, while the *Inflexible* turned to port to avoid the torpedoes. Three of them narrowly missed the *Indomitable,* one passed under the *Invincible* and two others passed very close.

Shortly after Hood had opened fire on the first group of German light cruisers another group of four vessels came out of the mist. The four destroyers, led by Commander Loftus Jones in the *Shark,* advanced with the greatest gallantry to attack them. The light

cruisers opened an accurate fire which damaged the *Shark* and *Acasta*. The *Shark*, in turn, torpedoed a light cruiser, which was probably the *Rostock*. The British destroyers then turned back, but three more ships came out of the mist and further damaged the *Shark*, which lay helpless and surrounded by enemy light cruisers and destroyers. After having been hit repeatedly by

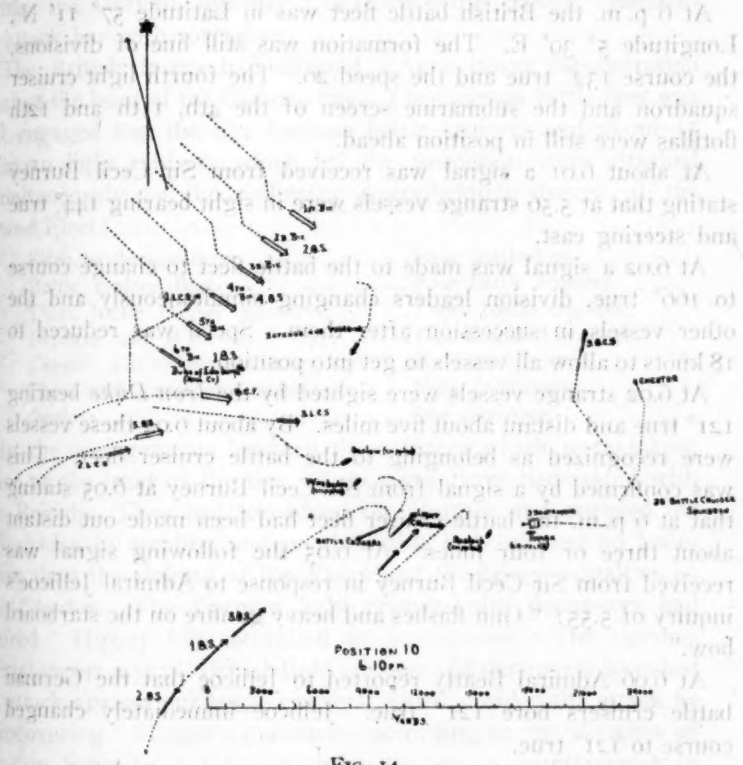

FIG. 14.

shells, two torpedoes, fired by a German destroyer, hit her and she sank with colors flying. Only six men of her heroic crew were saved. Commander Loftus Jones was killed, being awarded the Victoria Cross.

At 5.55 Sir Robert Arbuthnot was heading with the *Defense* and *Warrior* directly at the German light cruiser group, which he had sighted at the head of the German line. At 6.01 he changed course a little to the right so as to bring the German vessels on

the port bow. At 6.05 the *Defense* and *Warrior* opened fire and with their second salvos badly crippled the German light cruiser *Wiesbaden,* which hauled out of the line and lay dead in the water. The German light cruisers replied, but the range was too great for their fire to be effective. They withdrew to the southward, leaving behind the crippled *Wiesbaden.*

At 6 p. m. the British battle fleet was in Latitude 57° 11′ N., Longitude 5° 39′ E. The formation was still line of divisions, the course 132° true and the speed 20. The fourth light cruiser squadron and the submarine screen of the 4th, 11th and 12th flotillas were still in position ahead.

At about 6.01 a signal was received from Sir Cecil Burney stating that at 5.56 strange vessels were in sight bearing 144° true and steering east.

At 6.02 a signal was made to the battle fleet to change course to 166° true, division leaders changing simultaneously and the other vessels in succession after them. Speed was reduced to 18 knots to allow all vessels to get into position.

At 6.02 strange vessels were sighted by the *Iron Duke* bearing 121° true and distant about five miles. By about 6.04 these vessels were recognized as belonging to the battle cruiser fleet. This was confirmed by a signal from Sir Cecil Burney at 6.05 stating that at 6 p. m. the battle cruiser fleet had been made out distant about three or four miles. At 6.05 the following signal was received from Sir Cecil Burney in response to Admiral Jellicoe's inquiry of 5.55: "Gun flashes and heavy gunfire on the starboard bow."

At 6.06 Admiral Beatty reported to Jellicoe that the German battle cruisers bore 121° true. Jellicoe immediately changed course to 121° true.

At 6.08 the destroyer flotillas were ordered to take "Destroyer position No. 1." This was as follows:

11th flotilla. Three miles broad on the port bow of *King George V,* the leader of the left wing column.

4th flotilla. Two miles on the port beam of the second ship of the left wing column.

12th flotilla. Three miles broad on the starboard bow of the *Marlborough,* the leader of the right wing column.

The destroyers were unable to gain their positions before the deployment of the battle fleet. The disposition of two flotillas on

the left and one on the right of the battle fleet indicates that Jellicoe considered that a deployment to the left was most probable.

At 6.05 the destroyer *Onslow,* sighting a German light cruiser, probably the *Wiesbaden,* in a position favorable for a torpedo fire at the battle cruiser fleet, stood in from a position on the engaged bow of the *Lion* and engaged her with gunfire at a range of 3000 yards; the *Onslow,* sighting a German battle cruiser, closed in to attack her with torpedoes.

The British forces had effected a very heavy concentration against the head of the German line. The German battle fleet was not engaged and the five German battle cruisers and about 15 German light cruisers which led the formation were attacked simultaneously by the following overwhelming forces of the Grand Fleet:

Fifth battle squadron	Four battleships.
Battle cruiser fleet	Four battle cruisers.
Third battle cruiser squadron	Three battle cruisers.
Defense and *Warrior*	Two armored cruisers.
Chester, Canterbury, 3d lt. cr. sqd.	Six light cruisers.
Shark and accompanying boats	Four destroyers.
Onslow	One destroyer.

In the engagements between these forces which were taking place at the head of the line, all the advantages had rested with the British. They had torpedoed the *Rostock* and crippled the *Wiesbaden* by gunfire, and on their side had suffered no losses other than the sinking of the *Shark* and the heavy casualties on the *Chester.* The German light cruisers and destroyers had retired. Hipper felt compelled to do likewise. The German official report says: "British light cruisers and destroyers launched an attack against our battle cruisers, which avoided the attack by maneuvering." Hipper's maneuver, according to the sketches of Captain Schreibe, a German authority, was a countermarch to the right through 180°, bringing him on a southwesterly course and allowing him to close up the wide gap which had existed during the entire run to the northward between the German battle cruisers and their battle fleet.

XV. THE DEPLOYMENT OF THE BATTLE FLEET. MOVE IIA.

6.10 TO 6.30 P. M. POSITION IIA

The battle cruiser fleet continued on at utmost speed, steering easterly courses so as to gain a position which would place it

at the head of the battle fleet after it had deployed. Until 6.15 the course was 105° true; then it was changed to 56° true.

At 6.10 the three ships of the third battle cruiser squadron were maneuvering to avoid torpedoes fired at them by the German light cruisers. At 6.11 the *Invincible* changed course to 265° true after sighting the *Lion* in that direction. At 6.16 the *Inflexible* and *Indomitable* regained their positions astern of her. At 6.20 the German battle cruisers were sighted at a range of 8600 yards.

At 6.20 Beatty sighted the third battle cruiser squadron ahead and ordered Hood to take position ahead of him. At 6.22 Hood countermarched to the left and steadied on course 98° true, opening fire at the German battle cruisers at the short range of 8000 yards. At 6.25 Beatty altered course to 98° true and fell into column astern of Hood. The German battle cruisers were now concentrating a heavy fire on the *Invincible*, making numerous hits, none of which, however, caused serious damage.

At 6.10 Sir Robert Arbuthnot had been standing in toward the crippled *Wiesbaden* with the intention of completing her destruction. He came under the fire of the German battle cruisers, but gallantly continued on his course, passing at 6.15 ahead of the *Lion*. At 6.16 the *Defense* was hit by two salvos from the German battle cruisers and blew up. The *Warrior* was very badly damaged and passed out of the action to the westward, running astern of the fifth battle squadron. The *Duke of Edinburgh* was concentrating on the *Defense* when the battle cruiser fleet appeared ahead. She was therefore compelled to turn to port and head to the northeast. She later joined the second cruiser squadron. The *Black Prince* was seen to turn to the left at the same time the *Duke of Edinburgh* turned. It is believed that she passed to the rear of the battle fleet and in attempting to rejoin the British forces during the night was sunk by German battleships.

Rear Admiral Evan-Thomas, commanding the fifth battle squadron, had sighted the *Marlborough* at 6.06. Not seeing the other divisions, he believed that the *Marlborough* was leading the entire battle fleet and decided to take station ahead of her. At 6.19 he sighted the rest of the battle fleet and saw that it would be necessary for him to take station to the westward of it. He therefore went ships left about 90°, and then ships right 90° taking station in rear of the sixth division of the battle fleet. During these turns Evan-Thomas came under the fire of the German fleet. This fire

was generally ineffective, but one shell unfortunately struck the steering gear of the *Warspite* and jammed it so that she turned directly toward the Germans; running directly in front of the *Warrior*, she shielded that vessel from German fire. Although

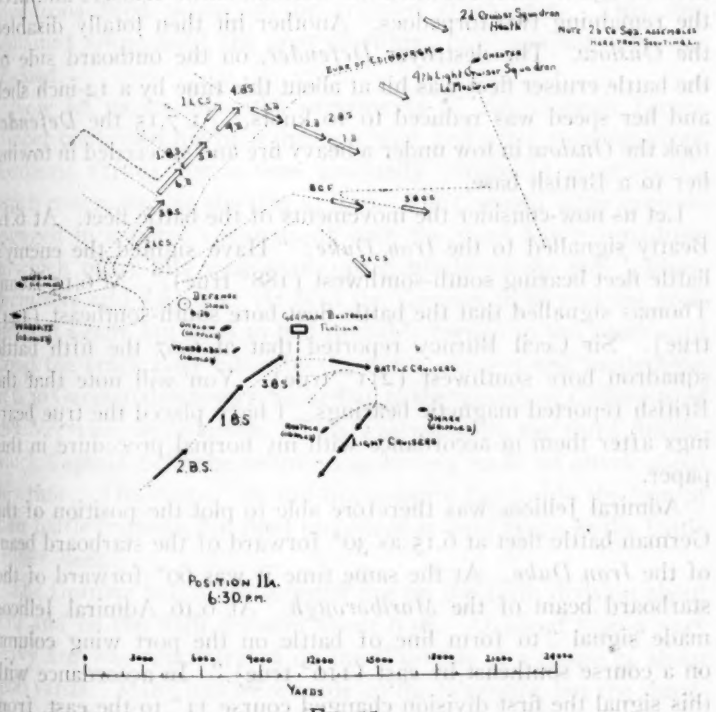

FIG. 15.

hit about 30 times by heavy shells the *Warspite* was brought out of action and succeeded in gaining a British base without difficulty.

At about 6.30 the third light cruiser squadron from its position on the engaged bow of the *Lion* launched a torpedo attack on the German battle cruisers. The *Falmouth* and *Yarmouth* fired torpedoes at a range of 7000 yards and then gallantly opened fire

with their guns on the German battleships. One torpedo probably hit the *Lutzow.*

At 6.10 the *Onslow,* Lieutenant Commander J. C. Tovey, was standing in to attack the German battle cruisers. After a favorable position was reached the order was given to fire all four torpedoes. After only one torpedo had been fired the *Onslow* was hit by a heavy shell. The captain, thinking that all torpedoes had been fired, headed away. Soon he discovered that he had three torpedoes left; he closed the *Wiesbaden* and torpedoed her; then he again headed toward the German battle cruisers and fired the remaining two torpedoes. Another hit then totally disabled the *Onslow.* The destroyer *Defender,* on the outboard side of the battle cruiser fleet was hit at about this time by a 12-inch shell and her speed was reduced to 10 knots. At 7.15 the *Defender* took the *Onslow* in tow under a heavy fire and succeeded in towing her to a British base.

Let us now consider the movements of the battle fleet. At 6.14 Beatty signalled to the *Iron Duke:* "Have sighted the enemy's battle fleet bearing south-southwest (188° true)." At 6.15 Evan-Thomas signalled that the battle fleet bore south-southeast (144° true). Sir Cecil Burney reported that at 6.07 the fifth battle squadron bore southwest (211° true). You will note that the British reported magnetic bearings. I have placed the true bearings after them in accordance with my normal procedure in this paper.

Admiral Jellicoe was therefore able to plot the position of the German battle fleet at 6.15 as 30° forward of the starboard beam of the *Iron Duke.* At the same time it was 60° forward of the starboard beam of the *Marlborough.* At 6.16 Admiral Jellicoe made signal "to form line of battle on the port wing column on a course southeast by east (110° true)." In accordance with this signal the first division changed course 11° to the east, from 121° true to 110° true. The leaders of the other five divisions changed course simultaneously from 121° true to 43° true, the other vessels following their division leaders in succession. These five divisions changed course to 110° true when they arrived in position astern of the first division. At 6.16 speed was reduced to 14 knots to enable the battle cruiser fleet to take position ahead of the first division.

At 6.14 shells commenced to fall near the ships of the sixth division. At 6.17 the *Marlborough,* having reached her course of 43° true, opened fire on the second division of the German battle fleet at a range of 13,000 yards on a bearing 20° abaft the starboard beam, 159° true. Twelve German battleships were in sight. As the other ships of the sixth division turned in succession on 43° true they also opened fire.

At 6.18 salvos commenced to straddle the fifth division, but no hits were made.

At about 6.20 a number of ships of the second and fourth battle squadrons fired salvos at the crippled *Wiesbaden.* This ship remained afloat until the next morning; only one survivor was rescued.

Now let us examine the movements of the German forces. Hipper continued his turn through 360° and after steering about northeast (true) for a time gradually turned to east (true), which course he was steering at 6.30. The German battle cruisers engaged in a fierce engagement with the third battle squadron, in which many hits were made, particularly on the two leaders, *Invincible* and *Lutzow.* At 6.10 the German light cruisers took the lead again, but by 6.30 had probably turned to the southward along the track later taken by the battle cruisers and battleships. At 6.30 German destroyers, according to the reports of *Collingwood* and *Neptune,* were visible. This was probably the third flotilla, which Captain Schreibe mentions as having made an attack about this time, The destroyers did not venture far inside the line of their battle cruisers, but fired torpedoes at long range at the battle cruiser fleet.

The German battle fleet opened fire on the sixth division about 6.14 and on the fifth division about 6.18. At about 6.20 a very heavy fire was concentrated on the *Warspite* at a range of about 8000 yards. Many hits were made on the *Warspite,* but the shooting at the British battle fleet seems poor. By 6.30 all the 16 battleships of the German battle fleet were firing. The six pre-dreadnoughts were probably a considerable distance in the rear and apparently did not take any part in the action.

While the visibility at this time had decreased it decidedly favored the British, according to the evidence of both Beatty and Jellicoe. This is probably responsible for the failure of the

German battle fleet to fire with more effect on the British first battle squadron.

By 6.30 the first three divisions of the British battle fleet were on course 110° true, the three following divisions and the fifth battle squadron were still on course 43° true, a course which increased their range to the German battle fleet.

At 6.10 the British had had a great superiority in the number of ships engaged, and the results obtained were in their favor. In the next 20 minutes, however, only four additional British battleships had entered the action, while 16 German battleships had become engaged. At 6.30, therefore, the superiority lay with the Germans and the results were highly favorable to them. The forces engaged at 6.30 were:

BRITISH		GERMAN	
Battleships	8	Battleships	16
Battle cruisers	7	Battle cruisers	5
Total	15	Total	21

The losses between 6.10 and 6.30 were:

BRITISH			GERMAN	
Sunk	Crippled and sank later	Crippled	Sunk	Torpedoed
Defense.	*Warrior.*	*Warspite.*	None.	*Lutzow* (also hit by gunfire).
		Defender.		*Wiesbaden* (already crippled).
		Onslow.		

(TO BE CONCLUDED)

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HOW OUR INFANT NAVY STRANGLED A WAR HORROR

By EDGAR STANTON MACLAY

During the last ten years the writer of this article has been engaged in collecting material for his "History of the United States," and one of the items brought to light in his exhaustive research is of peculiar interest (at this time when German ruthlessness in warfare is still tingling in the minds of the civilized world) showing, as it does, how the infant navy of the United States strangled a serpent of military "frightfulness" at the outbreak of the American revolution. This old-time "frightfulness" was worse than the gas bombs invented by the Teutons in the late war, more deadly than liquid fire and quite as destructive to human life and property as the pitiless submarine campaign inaugurated and carried out by the enemy in the great world conflict.

In order that we may better understand the viciousness and far-reaching influence of this "war horror," so adroitly choked off by our infant navy in 1775, we must remember that at that period wood entered, almost exclusively, in all army, navy and domestic construction; so that fire became man's greatest and most dreaded enemy. In the present day of steel construction, when danger arising from conflagration has been reduced to a minimum, it is difficult for us to realize the real terror inspired by flames a century and more ago.

An illustration or two will make this clearer to us. Down to the beginning of the last century, it was customary for Englishmen to date current events from the "Great London Fire." It was a catastrophe that seemed to be indelibly fixed in the Anglo-Saxon mind—rivaling, if not superseding, the era of Christian chronology. Indeed, there are Britons of the old school to-day,

who find it easier to recall the date of the "London Fire" than the year in which Trafalgar was fought. An illustration, even more forceful, is had in the title of the first considerable history of the British Navy. This was a comprehensive work in six large volumes, written by Captain Isaac Schomberg, R. N., and published toward the close of the eighteenth century. It was entitled "A History of the English Navy and an Account of the Conflagration in His Majesty's War Ships and Dock Yards." Evidently this pioneer historian of England's great navy was impressed with the then prevailing idea that the demon fire was quite as formidable an antagonist to contend against as the foe in human flesh.

Just before the outbreak of the American revolution, English artisans had perfected a device (the details of which will be explained further on) by means of which the rays of the sun were collected in a system of mirrors and reflectors and could be concentrated on a given point a mile or two away (then beyond effective cannon fire) so as to instantly set fire to any wooden structure and to cause the death of any human being facing its deadly heat. It was this weapon that several of the deposed governors of the royal colonies in North America planned to use against the refractory Americans with a view to "bringing them to terms." And, right here, it should be recorded that these diabolical "town burning" machines were shipped to the new world, not at the instance of the British Government, but in spite of official disapproval—for the humiliating fact has recently been discovered that these deposed governors (too many of them being of American birth) caused these machines to be secretly shipped to the rebelling colonies.

Fire and hanging seem to have been the favorite instruments of punishment resorted to by these royal governors when endeavoring to control the spirited Americans. We had ample evidence of this during Bacon's rebellion in Virginia in 1676. When Governor Berkeley finally gained the upper hand, he hanged 20 of the leading "rebels" and burned the houses of others. "The old fool has put to death more people in that naked country than I did here for the death of my father," exclaimed Charles II. When our revolution finally broke out, we find it only natural that the Royalists turned to fire as their most effective weapon for subduing the "rebels." "We will burn their town about their ears

and see if that will bring them to reason" declared the Royalists; and we had ample evidence that they fully intended to carry out this line of "repression" when at the beginning of hostilities, Captain Mowatt (at the instance of the Tories) burned the town of Falmouth (now Portland, Maine) while Governor Dunmore, by his direct orders, caused the total destruction of Norfolk, Virginia, by fire.

Town-Burning the "War-Horror" of Our Revolution

It was by the ruthless weapon of fire that the Royalists intended to bring the refractory Americans to their knees and, had it not been for the intervention of some of the leading members of Parliament, this "campaign of frightfulness" undoubtedly would have been carried out. And, let us keep it clearly in mind that this ruthlessness was advocated, not by the influential Englishmen at home, but by the American and Canadian bred Royalists whose hatred for the patriot cause spurred them to the use of weapons which the British Admiralty refused to use on the ground that it "shocked civilization."

We know how Edmund Burke, in Parliament, took exception to the sum of £160,837 in Sir Guy Carleton's accounts expended for carrying on "of a savage war in a manner contrary to the usages of the civilized nations against the English colonies in North America"; also the sum of £16,000 for the same purpose "in the southern department of Indians"; also the sum of £5000 which "hath been expended in carrying on a war of insurgent negroes against the inhabitants of the Providence of Virginia"; and excepting "whatever hath been paid out of said extraordinary specified in General Carleton's correspondence, for one hundred crosses and five gross of scalping knives, the said expenditures being disgraceful to religion and humanity."

And the same ministerial protest was made when the deposed governors and their royalist supporters sent to England for a ship-load of these "town burning machines." We have reason to believe that the Admiralty officially refused to ship these hideous weapons; but, as we can readily understand, the unconscionable Royalists, driven to desperation by hate and reverses, found means by which a ship-load was smuggled to America—that is, the diabolical cargo nearly reached the shores of the new

world, when the ubiquitous American sailor happened along and captured the whole outfit.

Capture of the Tory "Town-Burning" Machines

It was on the 29th of November, 1775, that the little American cruiser *Lee*, Captain John Manly (afterward a distinguished officer in the United States Navy) put into Cape Ann Roads with her prize *Nancy* which she had captured only a day or so before at sea. The *Nancy* was from England, laden with military stores for the British Army, then occupying Boston. Her cargo was officially listed as follows: Two thousand muskets and bayonets besides eight thousand fuses, thirty-one tons of musket shot, three thousand round shot for 12-pounders, a 13-inch mortar, two 6-pounders, several barrels of powder and fifty carcasses or great frames for combustibles to set buildings on fire."

It was the item of "fifty carcasses" that reveals the Tory plot to carry on the war for suppressing the Americans in a manner "disgraceful to religon and humanity." Evidently the American captors of the *Nancy* did not know what these "carcasses" were or, if they did, how to use them. They seemed to regard the great frames (each one made up of four or five hundred mirrors, prisms and reflectors) as some monstrous curiosity, concocted by some ingenious Englishman for the amusement of children or for the adornment of homes. The muskets, bayonets and other military stores found in the *Nancy* were immediately forwarded to the American Army then besieging Boston, but these "carcasses" seem to have been set aside as "unknown quantities." Without doubt, the mirrors were taken apart and utilized by colonial dames as a proper household appendage, the prisms may have been used to amuse the children while the reflectors came in handy on dark nights to enhance the feeble light of tallow candles. What we positively know, however, is that the patriots did not use these "town-burning machines" for their original object.

But the British military authorities in America did know just what these diabolical machines were intended for. We have conclusive evidence of this in a letter General Howe (then commanding the British Army occupying Boston) wrote to Lord Dartmouth in England. Howe had been apprehensive, during the autumn of 1775, over the investment of Boston by the patriot

army—however much he may have affected to have despised American military prowess. When he was informed that the *Lee* had captured the *Nancy*, his apprehensions were increased for he wrote, "The circumstance is unfortunate, as it puts in the enemy's hands the means of setting the town on fire." Howe knew that the "carcasses" were aboard the *Nancy* and he had every reason to believe that the enterprising and ingenious Yankees would quickly discover their object and mechanism, plant them on hill-tops overlooking Boston and, by means of their two-mile range, be enabled to set fire to the wood-built city in spite of any cannon fire the English could bring against them. Indeed, so deadly was the concentration of sun-rays these machines could focus at a given point, that no gun crew could face their deadly heat, so each cannon would be put out of commission the instant the "sun-fire" was played on its gunners.

How Our Infant Navy Helped to Capture Boston

It is far from the purpose of this article to detract in the slightest degree the credit so justly due the American land forces in their siege and ultimate capture of Boston. Washington's masterly stroke in the occupation of Dorchester Heights and planting thereon a battery that commanded the town below is one of the most brilliant achievements in military history—the fact that its accomplishment was bloodless not in the least diminishing its glory. Nevertheless, we have it in the written official words of General Howe himself that the capture of the *Nancy* "is unfortunate, as it puts in the enemy's hands the means of setting the town on fire."

This was as far back as November, 1775, and Boston was not evacuated by the British until the 17th of the following March. During all that intervening period, Howe knew that the Americans had in their possession fifty "carcasses," any one of which, if mounted on any of the hill-tops within two miles of Boston, could have set fire to the town. That the Americans were willing to make that sacrifice is clearly revealed by Avery in Vol. V of his great history (page 306) when he records "In fact the patriots had considered the destruction of the beleagured town [Boston] and the continental congress had authorized an attack 'notwithstanding the town and property in it may be destroyed.' Hancock

wrote to Washington, 'You will notice the resolution relative to an attack on Boston. This passed after a most serious debate in a committee of the whole house, and the execution was referred to you. May God crown your attempt with success. I most heartily wish it, though individually, I may be the greatest sufferer"—the bulk of Hancock's private fortune being invested in Boston real estate.

Luckily for all concerned, and for humanity in general, the Yankee captors of the *Nancy* did not know what these "carcasses" were for or, if they did, they refused to use them for their maniacal purpose. Nevertheless, the fact remains that Howe was "apprehensive" because these machines had fallen into the hands of the patriots. He, at least, knew what they were intended for. He knew that their murderous and inflammable breath would destroy Boston within twenty-four hours, making it not only impossible for his army to remain within reach of this "sun-fire," but rendering the withdrawal hazardous in the extreme. True, the American batteries on Dorchester Heights compelled the enemy's evacuation of the city, but for months preceding that, Howe knew that the Americans possessed machines which could have set fire to the town and driven him out in disastrous haste—and to that highly appreciable, military, extent, we find that the infant navy of the United States took a direct part in determining the British commander-in-chief to evacuate this "hot-bed of rebellion" in America.

Was Washington the "Father of the Navy"?

In this connection a most interesting point rises (a point which, hitherto, seems to have entirely escaped the attention of our historians) namely: was Washington the "Father of the Navy"? We are familiar with the arguments advanced in behalf of John Paul Jones and John Barry as being "Founders of the Navy," but here the stubborn fact appears that before Jones, Barry or any other seaman received their commissions, or indeed, before Congress decided to establish a navy, Washington, as the highest military official of the rebelling colonies, issued commissions on September 2, 1775, to armed craft for the expressed purpose of capturing enemy transports and cruisers wherever found.

This was a period when the colonists were still hesitating about resorting to arms in defence of their rights. Elbridge Gerry,

about this time wrote, "We had waged a ministerial war, and not one against our most gracious sovereign." It was not until October 13, 1775, that Congress appointed its first naval committee with power limited to fitting out two cruisers to intercept British vessels laden with military supplies bound for America, and it was not until the 13th of the following December that Congress authorized the construction of the first vessels for our navy. On December 22 the naval committee submitted to Congress the first official list of officers for our navy, yet we find that as early as September 2, 1775, Washington, in his official capacity as commander-in-chief of the colonial military forces, borrowed the armed schooners *Lynch* and *Franklin* from Massachusetts and commissioned them to cruise against the enemy. He also issued commissions for other armed craft, including the *Lee* which captured the "carcass-laden" *Nancy*. The *Lynch* and *Franklin* made one of the most successful cruises of the revolution, capturing ten British vessels together with Governor Wright of New Brunswick. In all, nearly forty enemy craft were captured by the cruisers commissioned by Washington which, when we consider that they were mostly laden with military supplies (which our land forces were desperately in need of) may be considered one of the important ocean campaigns of the revolution.

No one realized better than Washington the dominating part sea power was destined to play in the coming struggle. There was not enough powder in all the colonies to carry through a single campaign; and, what was more serious, the patriots lacked the material, machinery and money with which to produce the required article. Washington clearly saw that he must rely on sea captures for arms and ammunition and it was to this end that he wrote to Governor Cooke, of Rhode Island, suggesting that an expedition be sent to Bermuda to seize the military stores known to be there. Before the Rhode Islanders could act on this suggestion, however, Pennsylvania sent two armed vessels to Hamilton and captured the stores.

Possibly Washington's appreciation of the value of sea power was enhanced by the fact that he (when in his teens) had secured a commission in the royal navy as a midshipman but had been deterred from entering the service through parental solicitude. In any event, he clearly saw that the colonists in their struggle for independence must rely mainly on sea power to secure an

adequate supply of arms and ammunition. It would seem, therefore, that in issuing commissions to the *Lynch* and *Franklin* on September 2, 1775 (several weeks before Congress took definite steps for the formations of a navy) Washington became not only the "father of his country" but of the navy as well.

What Were These "Carcasses"?

Like many another war weapon, these "carcasses" were a growth rather than the invention of any one man. It is of historic record that Archimedes, by arranging a few mirrors in a frame so as to catch the rays of the sun and concentrate them on a given point, succeeded in burning the Roman ships that were besieging Syracuse. By using the same system of mirrors, it is known that Proclus destroyed the galleys of Vitalian when attacking Byzantium. Here were achievements sufficiently alluring to the war inventor to work on with the prospect of "wonderful" results—and the results seem to have been "wonderful" for we find that when the machine had been perfected so as to be available for sea as well as land battles, the British Admiralty firmly refused to use it on the ground that it was a "shock to civilization." These were the machines the royalist governors proposed to use in suppressing the American Revolution.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

SOME CASEY STORIES

By CAPTAIN W. P. CRONAN, U. S. Navy

Mr. Casey: "Well, Finnegan, the navy isn't what it used to be, is it?"
Finnegan: "No, sorr; and it niver was."

A writing man who once took a trip in a battleship, shipmate of mine, told me he never could write on board ship, as he was too close to events to see them with proper perspective. He had to let his impressions sink in, and think them out later at leisure. He said that he found it peculiarly difficult to get the special atmosphere of navy life. Maybe that is why officers write so few yarns; they are absorbed in their duties and have little leisure. There is no lack of material. There is a rich mine of anecdote in the navy, to be had for the digging.

So the other day, at sea, crossing the Atlantic, with time to spare, when I read Admiral Fiske's pointed remarks in the NAVAL INSTITUTE PROCEEDINGS, especially about thinking, I began to think on the subject of stories in general for the PROCEEDINGS, and I suddenly remembered some stories that have to do with the doings of a friend of mine named Casey, an officer of our navy. His name isn't really Casey, nor are all the names which appear herein really true, but the incidents are true, and really happened, for Casey told me so himself.

FINNEGAN

Some years ago, before the ensigns of to-day were breeched, Casey was an ensign in a small gunboat in the Caribbean, on the real Spanish Main. Even then there were wars, and rumors of wars, and a war was going on. The *M*——— made La Guaira her headquarters, and lay there watching, waiting, in company with several foreign cruisers, some English, some German, some

Italian, some French. Our whole fleet was at Culebra, and Admiral Dewey was in command of all our naval forces in the Atlantic, flying his flag at Culebra, in the fleet. There was no radio in those days, so the *M*——— stayed at the other end of the cable.

On a Sunday morning, bright, hot and clear, Casey, officer of the deck, was superintending the last finishing touches before captain's inspection, held on Sunday in those days. No detail escaped him; nothing could be too neat or trim, for they were lying not four hundred yards from the Pride of the Kaiser's Navy, between whose captain and Casey's, and hence Casey, a deadly feud existed, for the aforesaid Herr Kapitän had had the temerity to greet the *M*———*'s* captain in rotund Hoch Deutsch on the *M*———*'s* quarterdeck, at which umbrage was taken and expressed in no uncertain terms, for the *M*———*'s* skipper was only from Pennsylvania by Harrisburg, and there are no better.

In those days many of the petty officers of our navy were old-timers; relics of the sailing ship days, which had extended to a later date with us than with other navies. Many of them were North Countrymen, Swedes, Danes, and Norwegians, but most of them were Irish, and good Americans at that. One of the latter was Finnegan, and Finnegan was a type. He could outswear, outdrink, and outfight any man aboard, and was as gentle and sympathetic as a woman, if need be.

On this particular Sunday morning, Finnegan was coxswain of the running boat, a cutter lying at the boom, which was so neat and orderly that Casey sent for Finnegan in order to compliment him, for a bit of blarney went a long way with Finnegan, and besides Casey knew there would be a " back answer " and he wanted to hear it.

So Finnegan came aft on the quarterdeck, and after saluting Casey, removed his cap, twirling it in his fingers; a man of fifty, short, thickset, with close cropped gray hair, and roving blue eyes with a merry twinkle in them. There are few such petty officers nowadays in the deck ratings. Finnegan was only a coxswain and could never be anything else; did he rise, he was broken; did he fall, he was restored, for as a coxswain, he was priceless, he was the real thing.

" An' did ye want to see me, Misther Casey? "

"Yes, Finnegan, to tell you that I'm glad to see that there's at least one coxswain in this ship that I don't have to get after about that running boat; she's all right, looks fine."

A slow smile spread furtively over Finnegan's shrewd face, for Casey was by way of making up for being "Hhar'rd" on him after he had returned from liberty in Willemstad, in the Island of Curaçao, whither they had gone for coal the week before.

"Well, Misther Casey, you know how it is, wan of thim Ger'rman gintlemen was in char'rge of that boat lasht week, and beggin yer pardin, Misther Casey, they's only a few of *us* lift."

"Go for'ard with you, you flannel mouth," said Casey, and that was the end of it, for then the assembly sounded.

CASEY'S WATCH

It happened on the battleship cruise around the world. The fleet lay at anchor in the harbor of Callao, in Peru. Coaling was finished, and all hands were keen to see the Land of the Incas. Casey was a watch officer in the flagship, and coming off duty, decided to run up to Lima to see how the old place looked, and if it had changed since his previous visit as a midshipman. He wanted to go up the Arroya railroad to the top of the Andes, a treat he had missed before; a large party was going, and arrangements were to be completed that afternoon in Lima.

As Casey was putting on his shore-going togs, his chum and next door neighbor came in and asked if Casey would take his navy stop watch ashore and get it fixed; the crystal was broken, and the second hand was gone, for it had fallen down the ammunition trunk of its owner's turret that morning at drill; target practice was coming, and the watch was invaluable. "Sure, George," said Casey, "but the darned thing isn't worth it." "Well, don't forget it," said George; "it is the most important thing you have to do ashore; be sure to do it first."

So Casey went up to Lima, and the first thing he did was to go to a German watchmaker's shop to have the watch repaired; the watchmaker said he had no crystal to fit, nor any spare second hands of the right size; it would be necessary to send to Valparaiso and that would take a month, and the watch was no good anyway, because it wasn't made in Germany.

That disgusted Casey, so he went away, with the watch; he proceeded to the Club Union, to write some letters and to get in

touch with the party which would leave next day for the trip up the Andes.

Arrived at the club, Casey found it to be the usual South American club; like any club downstairs, but with a roulette wheel and baccarat tables upstairs. Sitting him down in the writing room, Casey removed some papers from his pocket, to consult them in settling some of the accounts of the wardroom mess, of which he was treasurer, and with the papers, he laid the broken stop watch on the table. Soon after, he saw one of his particular cronies from another ship coming into the club, and dashed over to meet him; together they proceeded to an adjoining room, where there was a grand party going on, sailor fashion, and soon Casey left to return to his papers.

On the desk he found his papers, but the watch was gone. Casey looked high and low, searched his pockets, called a servant, had him look about; no use, no watch in sight. "Hum," said Casey to himself, "George will give me the devil! The worst of it is he will say, 'I told you so!'"

Next, Casey went to the secretary of the club, and, in his best Spanish, told him of his great loss; how his watch was gone. But perhaps some servant, or maybe a member had seen it lying about, and would turn it in to the office, and if so, would the secretary have the goodness to keep it for him? The secretary was so kind, he was so sorry; he was sure it would be just as the lieutenant said; oh, yes, there was no doubt that the watch would turn up. Such things never, no never, happened in the Club Union. Was it not the greatest club in Peru? It was. Did not the Presidente himself belong? He did. So Casey left for the top of the Andes, telling the secretary he would return in two days for the watch.

In due time Casey returned, having sufficiently recovered from the sirroche resulting partly from the altitude and partly from the organization of the Order of the Llama at the aforesaid altitude, about 26,000 feet. Proceeding directly to the Club Union, he was informed by the Señor Secretary, sadly, that the watch had not been found; but, "do not be downcast, señor, I assure you that it will be found; oh, yes, truly, for the wives and children of the members will go without shoes rather than that the watch should not be found."

Casey returned aboard, and meekly confessed to George, handing him his own stop watch (both watches belonged to the ship)

and telling him that he'd get another when the ship arrived at San Francisco. George couldn't help rubbing it in, being human, and Casey was much discomfited; but soon they both forgot about it.

A few days later in the forenoon, the fleet was preparing for sea; Casey was off watch, in his room. The officer of the deck's messenger, a particularly sassy little sprat, knocked at Casey's door, stuck his red head and freckled face inside, and said, "Officer of the deck wants to see you, sir," getting even with Casey for having had to toe a seam the previous afternoon, the deck having been hot and the messenger barefoot; even if he had been trying to teach the monkey to write, it wasn't his fault if the monkey had upset the ink bottle all over the deck.

Said Casey to himself, "Well, I wonder what he wants of me," and went up to the quarterdeck, where the Officer-of-the-Deck indicated three exceedingly well dressed gentlemen who awaited Casey.

They had on the most finished of Parisian attire; with not only top hats, but violets as well; they were as well turned out as any members of the Higgy Leafy could be. They advanced as one upon Casey, they bowed as one, they were so polite that as Casey said afterward, "I wondered what in —, well, what I had done." One spoke in beautiful Castilian, which must be seen as well as heard to be appreciated, "Is it really the Señor, the Lieutenant, truly the same, who had the great misfortune to lose his watch in our club, our Club Union?"

Said Casey, hedging a bit, "It is."

"Well, Señor, we are a committee sent on board, on the part of the club; we have come from Lima, all the way, to see you very privately, if you please, in your room, if you would be so good."

Casey led them below, wondering what he had done that they didn't like. It looked serious.

Soon they arrived at his room, and, the door being closed, the spokesman said, "Señor, you have said that you lost your valuable watch in our club, is it not so, yes?"

"Yes," said Casey, "it is so."

"Well, Señor, it would not do for you to say that you had suffered such a great loss in our club; everywhere you go, on your way around the world, everyone would say, ah, you had a good time everywhere but in Peru, is it not so?"

"Maybe," said Casey, who by this time had succeeded in ringing for his very efficient boy, who knew his every mood, and needed no words to receive the idea he obtained through the half opened door.

"Ah, Señor, Peru is poor, but very proud, not rich like your great country; so it is with our club, for it too is Peru, for the Presidente, and the Vice Presidente and nearly all the members of Congress belong to it, and they all are so sad over your loss, yes, everyone is sad, one talks of nothing else in Lima, we have no watches in Peru like the valuable watch you lost, but—" and as he made a movement towards his pocket, Casey divined what was coming, and held up both hands in restraint, "Oh, Señor," said Casey, "please don't think of it, it was all my fault for losing the watch. I belong to several clubs in America, and I assure you that if I had left my watch lying around loose in any one of them, and lost it, the House Committee would say it served me right."

"Oh, no, Señor, look, see what we bring to you; and we ask forgiveness, in the fullness of our hearts." Whereat he drew forth a morocco leather case, with Casey's name on it in gilt letters; within lay a masterpiece of the watchmaker's art, with Casey's initials, anchors, chains and such engraved on its back, and well encrusted with jewels within.

Before Casey, overcome with surprise, could reply, the door opened, and in came Casey's boy, always attentive, and in this case, at least, on time. It was a hot morning, and the quart of cold champagne was consumed with gratitude by the visitors from Lima, for the road to Callao is dusty. Before they left, they embraced Casey, and even on the quarterdeck. The last words Casey heard from them were hailed from the departing boat, "Remember, when you come back to Peru again, as Admiral commanding a fleet, we shall say, where ees ze watch?"

Casey went below, slowly, musingly, to his room. There he took up the leather case, opened it, took out the watch and had a good look at it, both sides. It was really so! Returning it to the case, he knocked gently on the door of the next room, and entered. His friend George was writing at his desk, and looked up, with a cheery welcome.

"Hello, Casey, what's up?"

"George, I've been thinking about your watch, and that I ought to tell you how sorry I am."

"Oh, that's all right. I've got yours, you know," said George. "Speaking of watches, George, what do you think of this one I got here?" and out of its case came the resplendent new watch.

George took it, looked it over, admired it and replied, "It's a beauty, but what on earth possessed you to blow yourself for that; you're a regular sailor, why don't you save your money?"

"Oh, it didn't cost me anything, George, old boy, that's what they gave me for losing *your* watch."

SAILORMEN'S MANNERS

Sailormen are children of nature. They live in a world far removed from that of the ordinary mortal, and know and observe but few of the conventions of polite society.

Tom Greene, boatswain's mate 2d class, captain of a 12-inch gun in Casey's turret, was Casey's pride and joy, for of all of the men in his division, Greene was the best.

It did Casey's heart good to watch Greene at drill, for he made no mistakes, and was a natural born leader, inspiring all the others. When he stood by the breech, loading, stripped to the waist, he looked like a young Greek god; his muscles rippled and slipped under the satiny skin like ropes, and the sails of the full rigged ship on his chest filled and swelled as if the ship were at sea in a breeze.

It was at target practice that he was at his best; silent, quick and calm, he patted each silken bag of powder almost affectionately as it whished past him, guided skilfully into place before the rammer head; from priming until after the gun was fired, he stood eagerly waiting for the next cycle to begin, and so well trained was his crew that the actual loading seemed slow, although the gun fired over two shots a minute—nearer three.

No one would be apt to call Tom Greene a coward; but there were times and places where he was nothing but an arrant coward. That was when there were any women near him. He literally knew nothing about them, because his was a man's world.

When the battleships arrived at San Diego, the hospitable citizens gave a huge barbecue in generous California style, for all the men of the fleet.

Tom went; he didn't know what a barbecue was, but when he got there he was hungry, and the barbecue was just what he had been looking for. It was a gorgeous feast, with all the fixings.

San Diego had done itself proud; the fairest daughters—and there are no fairer girls in all this world—had volunteered in crowds to act as waitresses. The barbecue was a huge success. Tom, lying on the ground, leaning up against a eucalyptus tree, was—well, he wasn't "fed up" as the Limies say, but he was full up, and, with a sigh of content, proceeded to roll a cigarette with tobacco of the Toro brand. When that was lighted, Tom was happy.

Just then one of the fairest of Eve's daughters spied Tom. There was something about Tom's looks that made her want to give him a piece of pie. So she coyly sidled up to Tom, and asked him if he would have some pie, telling him that her mother had made it, it was no baker's pie!

Tom gulped in dismay, then to her shocked surprised, he said, "Naw, Hell, I don't want no damn pie!"

Which same was the real truth. He had neither need nor room for that pie, and wished to convey the idea in the only language he knew.

The fair one departed abruptly; and knowing nothing about sailors, she proceeded to tell her woes to the lady governesses of the barbecue, who waxed very wroth, and informed the mayor about it; the more they talked about it, the more serious it appeared to them, so to appease their wrath the mayor promised to inform the admiral which he did.

After duly considering the matter, the admiral, not having been born yesterday as it were, doubtless consulted with his wife, as all good admirals do in such predicaments. At any rate, it was arranged that an apology would be tendered to the committee of lady governesses at the City Hall, in the mayor's offices, by some representative petty officers from the flagship.

Chairman of the committee from the flagship was, of course, the chief boatswain's mate, John Jennings, who, as a sailorman, was Tom Greene raised to the Nth power. There never was a better sailorman than John Jennings, nor one more afraid of skirts. Nevertheless, John Jennings turned up with his two helpers, at seven bells, as agreed upon, to apologize. All the way in to the inner harbor and the dock, they had been striving to think up something to say, but on arrival at the City Hall they had come to no decision in the matter, and were in a pitiful state of apprehension. The ladies, seated in quiet dignity, were awaiting them as

they filed into the mayor's offices more like truant schoolboys, than as the bravest and best men afloat.

Silence.

Finally Jennings stepped to the front, pulled at his grizzled forelock, twirled his cap, and studied his toes. Glistening beads stood forth on his brow. The ladies felt so sorry for him that they would have called it off then and there, but no, John Jennings had come to apologize; and apologize he would, and did.

"You see, Mum, it's like this: Tom Greene's a heluva good sailorman, but the ——— ——— ——— ain't got no manners!"

Which apology was gravely accepted as quite satisfactory.

THE TOP SERGEANT'S STORY

Casey had become the gunnery officer of a battleship, and his heart was full of joy thereat. But no greater amusement was afforded him than to listen to the morning report of Sergeant G———, who rapped on the door of the marine captain's room promptly at eight each morning, hauled aside the curtain smartly and proceeded to inform the captain, and regale Casey with the doings of the day before, the needs of the moment, and his hopes and fears for the future, in a brogue which was a mixture of treacle and brimstone.

Here is one of his tales:

"I was over, yisterday mor'r'nin, like ye towld me, sorr, to the W———, about thim baynits, and whin I got there, there was B——— (the marine captain) giving that fat sergeant of his the divil, him being three days' overtime and with the rats, and himself sthandin' there the while, pouring himself out a dhrink, the bottle in wan hand, the glass in the other, the while he was telling the sergeant to go for'rard for being a dir'rthy dhrunken swab, he did, and I niver thought there was more than one man in the marine corps mane enough to do a thrick like that, and that's Tippy ———, and he done it to me out in Guam."

The story was too good to keep, so Casey told it in the wardroom of the W———, whither he had gone to lunch, much to the discomfiture of the marine captain.

On Saturday forenoons, the detachments of marines in the ships at the Yard were paraded with the garrison; on the next Saturday, after the parade, the colonel, none other than the aforesaid Tippy ———, sent for the sergeants, dramatis personæ, saying, on their

arrival, that stories had come to his ears reflecting on their officers, originating with Sergeant G———, who was to go back to his ship and keep his flannel mouth shut, for the honor of the marine corps, *if he could!*

As for the other, there were ways of dispensing with his services as a sergeant, unless he kept sober.

Next morning, at eight, Sergeant G——— rapped smartly on the captain's door, and Casey heard the grievous plaint:

"'Twuzn't in Guam he done it, 'twuz in Cienfoogus!"

CASEY AND THE ADMIRAL

The flagship of the Atlantic fleet lay at anchor in the harbor of San Francisco, on a pleasant afternoon, during the cruise of the fleet around the world.

Casey was officer of the deck, having come on watch at 4 p. m. A new commander-in-chief had just hoisted his flag aboard; the watch officers were on the alert, to know the methods and whims of the newcomer. During the afternoon a large party of children from a San Francisco orphan asylum had been on board, invited to see the ship through the kindly thoughtfulness of the admiral's wife. The children had gone all over the ship, into every nook and corner, and spent the afternoon most profitably. When they left the ship just after Casey took the deck, they were accompanied by the admiral's wife, and gave three cheers in childish treble for the admiral, who was then left quite alone on the quarterdeck.

For Casey, knowing full well that those who would speak with kings must wait, had retired to the port side of the quarterdeck, leaving the admiral alone to enjoy a stroll up and down the deck.

The admiral was pleased as Punch, and looked it. Like all humans, he wanted to share his joy, so he motioned to Casey to join him saying, "Officer of the deck, come over here, I wish to speak with you." Casey crossed over to the starboard side promptly, saluting the admiral as he did so.

"Well, Mr. Casey," said the admiral, "those were very bright children who were on board this afternoon, weren't they?"

"Yes, sir."

"They asked a great many questions about the ship, the guns, and the engines, didn't they?"

"Yes, sir."

"And they will go home and tell their parents all about it, won't they?"

"No, sir, I don't think so."

"Oh, you don't think so, and why don't you think so?"

"Because they're orphans, Admiral."

The admiral stroked his chin, musingly; then turned on his heel, walked aft and leaned on the rail.

Casey watched him go aft and thought to himself that he had a task indeed; a new admiral to take in hand. "And just to think, he has been president of the War College, and a delegate to the Hague Convention, and the Lord only knows how much he knows."

Slowly the admiral turned from the rail and stepped over the hatch coaming to descend to his cabin. As his head was about to disappear, he called Casey to him, and said, with a twinkle in his eye, "Mr. Casey, I don't even allow officers on my staff to talk to me like that!"

When the cruise was over, no officer in the ship had a higher opinion of the admiral than Casey, although they had several similar differences of opinion during the cruise.

Then Casey decided to go to the War College, to see if there was anything in it, and as he approached the portals of that hall of learning, who should be leaning against a pillar, to greet him, but the admiral, who slyly remarked,

"Well, well, look who's here. Well, Mr. Casey, what are you going to say to me now?"

Casey had little to say until one day when he became much perturbed over his lack of knowledge in general in respect of a particular task in strategy assigned to him, so he betook himself to his old friend, the learned admiral, whom he found in the library, for guidance.

The admiral said, "Well, Casey, so you think I do know something about this, eh?"

Casey admitted that if anyone should it would be the admiral.

"Well, I don't," said the admiral, "but the answer is there, go find it," and with a gesture he indicated the well laden shelves of the library.

"That is what you came here for, to seek, and to find, and what you find out for yourself is of the greatest value; it is all there."

And Casey, who had come to the War College to scoff, remained to pray.

DISCUSSION

"U. S. C. N."

(See Page 1699, Whole No. 200)

Lieutenant J. B. Wellman, U. S. N. R. F.—Lieut. Commander McIntosh's article is one of the most enthusiastic and comprehensible arguments favoring the extension of America's commercial "Sea Power" that I have ever read; presenting, as it does, the greatest fundamental truths in an exhaustive, yet apparently elementary, manner; a manner so apparently elementary that even the most ignorant or prejudiced cannot fail to appreciate and thoroughly understand the situation. Not only does he present the situation, but proposes a remedy; his first six articles already predisposing the reader to voice the resolution that—even if the remedy, the commercial navy, were operated at a loss themselves, the pecuniary loss of operating the commercial navy would be more than compensated for by the direct, or indirect, gain to the country at large; gains pecuniary, commercial, and industrial. Article V might have been better terminated had he voiced the plea for free tolls for vessels passing through the Panama Canal on coastwise voyages bound from and to American ports on either coast. Should such a thing be now proposed, I do not think that the private interests, such as formerly controlled American railroads, would be able to construct sufficient opposition, or even have the same reasons for propagating propaganda opposing this constitutional right of American coastwise commerce that they formerly had.

In one thing alone is he singularly unposted. This attitude or impression has been obtained, undoubtedly, through the patriotic unselfishness of marine engineers as a whole. I refer to his "Proposed Complement U. S. C. S. *Antigone*": in this proposed complement he advocates:

Deck	Engineer
In command, 1 lieutenant commander.	1 lieutenant commander, chief engineer.
1 lieutenant.	3 machinists or chief machinists.
1 lieutenant j. g.	
1 ensign.	
The above to correspond to:	The above to correspond to:
Master.	Chief engineer.
1st mate.	1st assistant engineer.
2d mate.	2d assistant engineer.
3d mate.	3d assistant engineer.

He assumes that the engineer officers will consent to accept a proposition proposing less pay for them than the deck officers. When I make

the statement that hundreds of the reserve engineers left the service vowing never to return and that this attitude was provoked by the pecuniary discrimination they suffered, particularly the chief, first and second assistant engineer officers, I am making a statement which can be verified by anyone who chooses to step into any marine engineers' local headquarters. When the naval reserve was first proposed to the members of the naval auxiliary service, this condition was not extant and equal position prescribed equal pay. Why or how this proposition was later changed, I do not know, but this I do know: the majority of the good assistant engineer officers of the naval auxiliary service have since left it at the first opportunity, the remainder remain hoping that conditions will change, and probably for the same reasons as myself, that they have naval preferences due to previous service or affiliations which incline them to disregard, apparently, this discrimination.

For a first and second assistant engineer officer to receive less pay than the corresponding deck officer is, in the merchant marine, an impossibility. Actually, while second, and later first, assistant engineer, in the employ of a certain eastern steamship company less than three years ago, I received more pay than the corresponding deck officers. This was an exception and unjust, but it is a fact.

A vice-president of a certain west-coast steamship company, mentioned in "U. S. C. N.," once told the master of one of his ships that "there are but four officers absolutely required for the safe navigation of a ship: the master, chief, first and second assistant engineer officers. After getting clear of, and until within easy distance of port, the quartermaster could be trusted with the wheel to hold the course (this was in pre-war days), the master only being required for emergencies and when entering or leaving port. Furthermore, the changing of chief engineers costs us on an average $15,000, while to change masters costs no more than a new set of bedding." This is the limit of presumption, but was prompted by the fact that one of their ships was brought home safely over a distance of over a thousand miles by the chief engineer, not a deck officer being aboard.

With the proposed changes incorporated in this article, I would propose the widest distribution of it. Donate it to the largest newspaper syndicate, and to the most popular weekly journal (say the *Saturday Evening Post*) and to any others which might be induced or have sufficient interest to publish it. With or without the proposed changes, it cannot help but awaken the liveliest interest and discussion among the people at large, few of whom ever heard of the PROCEEDINGS, or would ever have the pleasure of having the facts laid before them in a more lucid or agreeable manner.

ERRATA

U. S. NAVAL INSTITUTE PROCEEDINGS NO. 200

DISCUSSION

A Few Notes on Alternating Current

By Lieut. Commander Ellery W. Stone, U. S. N. R. F.

TYPOGRAPHICAL ERROR

Page 1759, line nine, third paragraph, "600 cycle" should read "60 cycle."

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ANNAPOLIS, MD., NOVEMBER 15, 1919.

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PREPARED BY

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FRANCE

THE FRENCH VERSION OF THE FUTURE OF THE SUBMARINE.—It is not doubted that the submarine will survive the war. Because a disloyal enemy has acted contrary to the rights of peoples and other nations is no reason why other nations should be deprived of a means of defence already proven.

The submarine makes henceforth part of a fleet logically constituted and all the navies will join in possessing a certain number of them whether for offence, defence, or for a reserve force. It cannot alone constitute this force, but it is henceforth one of the necessary elements.

Under which form and what are, at this point of view, the teachings of the war?

This leads us to remark that the progress made by the submarine during this time when so much was being told about it has not been very great.

Its progress has been not at all comparable to that of aviation. In reality nothing hindered the construction in 1914 or even a little before of boats like the submersible cruisers of which Germany was so proud in 1918, and whose results were only of a mediocre kind. The only true innovations realized since the beginning of the war consist in the mounting of artillery and the planting of mines. Now the artillery has but little interest except for attack of unarmed merchant ships and in this respect does not merit attention, besides it is installed without great difficulty upon a submarine of medium dimensions. As to mines, their planting exacts the greatest discretion in the operation of anchoring and no other kind of vessel is so adapted to the work of planting them unknown to the enemy. It is probable that all the submarines constructed in the future will be mine-planters, and at the same time torpedo-boats like the last German U-boats and the English L-boats.

Apart from the addition of new arms, perfection of detail is seen in the most recent submarines. Is that a great progress and will this evolution continue? It is permissible to doubt it. The increase of dimensions is only a means of uniting in each unit more power, greater speed, more security. Now, the power of a submarine depends upon the torpedoes which influ-

ence but little its displacement; the embarking even of several reserve torpedoes does not require great increase of tonnage. Speed in this class of vessel costs more weight than all others and while its value is not deniable it is less great than in a cruiser or a torpedo-boat. As to safety, it is less assured in a large submarine than in a small one because the first conceals itself less easily than the second, and above all, because there is danger of a torpedo from one of like kind, the effects of which cannot be diminished by its compartments unless sizes are used which are unknown at present.

In the 300 submarines that Germany has constructed during the war there are many differences of displacement from the 200 tons of the first U. B. up to 2400 tons of submersible cruisers. Against ships of war, as well as against merchant ships, the very large submarine has shown itself less useful than the very small one. Those who have made great trouble for the Allies are the submarines of medium tonnage, the U. and the U. C. from 600 to 1200 tons. It seems that 1000 tons permits realization in a very satisfactory manner of a plan of a submarine provided with all necessary qualities and that it may be wise not to exceed this figure.

The French Navy had been the first to approach it with the *Nereides* and *Gustave Zede* and we may remark at this time that the plan of these vessels worked out in 1910 is not far from the plan which has given birth to the best English and German submarines of 1917 and 1918.

Yes, a question in the construction of motors, alas! and also the endeavor to get a too great speed with too small displacement have hindered these ships from having all the value expected of them; it is not less true that our navy, before all others, has endeavored to realize a conception which only obtained hold elsewhere much later and under the pressure of events.—*Moniteur de la Flotte*, 8/2.

PROPOSED FRENCH SCHEME FOR MAINTAINING HER NAVAL POWER.—In the July 16 number of our English contemporary *The Naval and Military Record* is found the following comment:

"In warships of all sorts England decidedly holds the lead on the list, while France finds her resources in naval construction paralyzed by the invasion and devastation of the enemy. France's opposition to the proposition of destroying the German fleet interned at Scapa Flow is well understood if one regards this sentiment in the light of the Republic's natural anxiety concerning the filling-up of the gaps made in her navy through the happenings of the war. The position of the principal navies of the world from the point of view of modern battleships, at the beginning and at the end of the war, was as follows:

"Great Britain, 33 in 1914, 35 in 1919; France, 18 and 17 respectively; Italy, 6 and 10; *United States*, 14 and 23; Japan, 4 and 9; Germany, 19 and 21; Austria, 4 and 2; Russia, 9 and 8."

The last three powers may be disregarded by us. Let us not forget (as the *Record* has done) that the surviving battleships of Austria now fly the Italian flag (see a list of them given in the *Vie Maritime* of June 10, 1919, page 6), and we shall then have the following list:

	England	U. S.	France	Italy	Japan
Modern battleships	35	23	17	10	9
Battle-cruisers	10	6	None	None	4
Old battleships	6	13	5	4	6
First-class cruisers (protected cruisers)	19	12	15	5	12
Light cruisers	90	13	3	6	8
Destroyers	390	326	96	58	?

This list, according to *Brassey* of 1919, "brings forth the satisfactory evidence that the English have every reason for self-congratulation concerning the present strength of their fleet, and should have all confidence

that for several years to come they will be able to maintain the command of that sea communication which is of so vital an importance for the existence of the Empire. In view of what has been done by the Americans, this outlook seems full of optimism.

And we French, what conclusions may we draw from this condition of affairs?

We have 17 battleships, so-called modern, but without value because they lack speed, and not a single battle-cruiser, and this after a war in which the immense strategic and tactic importance of speed has been demonstrated. Our 15 first-class cruisers are 15 old protected cruisers; the plans of the more modern of these date back to the year 1905 (fourteen years!), their speed varying, on paper, from 24 knots to 20.5 knots. With this slow speed they cannot chase the light enemy cruiser with a speed of from 27 to 30 knots nor escape from those battle-cruisers carrying 305 or 380 mm. guns! Our protected cruisers are not even equal to those of the Arbuthnot division which were annihilated in a quarter of an hour while under fire at the Jutland battle.

Our light cruisers, what of them?—the *Guichen,* the *Chateaurenaud,* and the *Jurien de la Graviere* . . . . making 23 knots on paper, 20 and even less by actual tests made from 1899 to 1901, twenty years back, alas!

What of the destroyers? There are scarcely twenty of them, counting those of the Japanese. The rest are worn to the timbers through the intensive four years of war service without a respite. Moreover, they are very lightly armed with poor little 380 and 450 cm. torpedoes and with miserable 47 and 65 mm. guns, while nowadays torpedoes everywhere measure from 50 to 60 cm. and the guns of destroyers are from 100 to 150 mm.

Our naval force is now but the shadow of its former self.

In order to raise the navy's standard we would not be able to construct a fleet of 12 speedy battleships. Costing 150 millions of francs each, the sum expended for this construction would be about three billions. And moreover where would we get the armor-plate, the workmen, the metal and the constructive materials needed for these monumental works in steel?

We should, therefore, carefully put in working condition the submarines and torpedoes we already possess. We should push to the supreme point of perfection our naval aviation force and our coast defences (movable batteries on rails and highways), purchase light warships of an extremely rapid type, and, above all, construct *submarines* and *bombing planes,* impressing upon ourselves the fact that these will never be rapid enough or perfect enough nor will their torpedoes be powerful enough . . . .

The French navy should more than ever be in the extreme advance guard of naval progress. As the material accumulates for the production of this power, we should be quick to seize with intelligence these new forces and apply them properly.

If the French navy wishes to survive it should leave the broad highway and cease to follow in the wake of England. She should regain her individuality and she must labor, seeking in her own brain for new ideas, and of each new idea make the greatest possible use.—*La Vie Maritime,* 7/25.

FRANCE'S PEACE ARMY.—From the statements which have been issued as to the reorganization of the French Army, it will be seen, as most sane people foresaw, that France has not concerned herself with the declarations of some of the leading men in this country, that conscription was to be done away with not only in England but throughout Europe. The French statesmen have throughout maintained that their country occupies a very different position than do two of the more powerful of the nations which if she is attacked are to rally to her support—the one from across the Channel, the other from over the Atlantic. France retains the principle of compulsion in the recruitment of her future army, and the only change she has made is in the strength of the levy which annually she will call to the colors. In pre-war days she called up every year 600,000 men for military training,

whereas in the future her army is to be recruited by calling up an annual class for active military service, reduced to one year on a universal compulsory basis, of 200,000 men only, and by enlistments and re-enlistments forming a regular section of the army of 150,000, the total peace strength being only 350,000 men, increased on a war footing to 1,300,000. If we add the territorial and reserve forces, we may consider these as forming a reserve of some two million, and it cannot be said that this provides an excessive force for a nation which may have for ever to stand on the outposts in face of an enemy which is momentarily crushed, but which, having been left her cadres, may find small difficulty, given the opportune moment, in re-constituting her army.—*The Army and Navy Gazette*, 9/27.

THE LOSS OF THE FRENCH TORPEDO-BOAT "325."—On the 22d of January, 1919, the torpedo-boat *325* commanded by Lieut. Commander Senac proceeded to the clearing of mines designated by the German authorities in virtue of the armistice and planted in the north channel of the Kerkenna Islands. These mines had not been previously marked.

Suddenly the captain and the captain of the watch perceived at the same time a mine submerged at a depth of 5 feet and distant only about 3 feet from the hull. The signal was given to back astern, but the *325*, pushed forward by the wind and sea, passed over the mine which, probably hit by the hull or screw, exploded about five or six seconds after being seen.

The explosion was formidable. The after part of the torpedo-boat was entirely destroyed and disappeared immediately, while the forward part at an angle of 45° sank soon afterwards, dragging with it 18 unfortunates imprisoned in the forward part.

The small boats of the other torpedo-boats, present at the place, rescued only eight survivors, among whom was the commanding officer who had been thrown into the sea with the rest of his crew.

In a hearing on July 25, the War Council of Toulon investigated the responsibility of the commander of the *325* with regard to this sad occurrence. Finding that no criticism could be made against Lieut. Commander Senac, the Council acquitted him unanimously.—*Moniteur de la Flotte*, 8/2.

THE FRENCH NAVY IN THE MEDITERRANEAN.—A ministerial decision of June 25 fixed the organization of our naval forces in the Mediterranean. It is stated that this organization is "provisional,"—that is to say, to continue until Parliament or public opinion imposes modifications on this organization.

We will have in the Mediterranean:

1. A vice-admiral C-in-C (Vice-Admiral de Bon) having a force of unclassified vessels, *Provence* and *Jurien de la Graviere*.

2. A vice-admiral (Vice-Admiral Charlier) commanding the 1st Squadron, composed of the battleships *Courbet, Jean-Bart, France, Paris, Lorraine* and *Bretagne*, with a rear-admiral, second in command (Rear-Admiral Violette).

3. A 2d Squadron composed as follows:

A rear-admiral (de Marguerye) division of battleships,—*Voltaire, Condorcet, Diderot*.

A rear-admiral (Lejay) division of cruisers,—*Jules-Michelet, Waldeck-Rousseau, Ernest-Renan*.

4. Four divisions of destroyers of six units each,—two with full and two with reserve complement.

5. Two mine layers, one of which is armed, for the Black Sea.

6. The sloops *Antares, Alyol, Altair;* the "avisos" *Escaut, Scarpe, Suippe* and *Yser;* the "cannonieres" *Tapageuse, Courageuse*, and *Agile*.

7. The mine sweepers *Gres, Marbre, Rateau*, and *Coquelicot*, with four sub-chasers, destined for the operations in the Black Sea.

8. A rear-admiral (Mornet) commands the Division of Syria, at Port Said, comprising the yacht *Phenix*, the cruiser *Cassard*, 3 cannonieres and 2 mine sweepers.

9. A rear-admiral (Excelmans) commands the Division of Naval Bases of the East, comprising a villa on the Bosphorus, serving as quarters of the admiral and his staff, the yacht *Luciole*, a hulk, the *Tourville*, at Constantinople, the tanker *Shamrock* at Salonica, and a half dozen service vessels.

10. A flotilla of the Danube,—6 cannonieres and 10 vedettes.

11. A train, comprising one oiler and one repair ship.

12. Four ships (one the *Guichen*) for the line of supply.

13. A rear-admiral (Ratye) at Venice, for the surveillance of affairs on the Dalmatian coast. His yacht, the *Atmah*, has just been disarmed.

We have, then, exercising the command of the Mediterranean, two vice-admirals and six rear-admirals, without counting the staffs of the ports and navy yards. This number is just one vice-admiral less than during the war.—*La Vie Maritime et Fluviale*, 7/25.

GREAT BRITAIN

RETRENCHMENT IN FULL SWING.—The process of reducing the navy and of all expenditure in connection therewith is being carried out with a rapidity and a ruthlessness which should gladden the heart of the most zealous economist. Many more ships, including several which are of modern design and quite efficient in every way, have lately been added to the disposal list; while scores of others have been, or shortly will be, paid off and reduced to "care and maintenance" status. The Home Fleet is to be brought down to reserve complements, leaving the Atlantic Fleet the only fully manned force in home waters. At the same time, wholesale discharges of employees at all the Royal Dockyards are taking place, and although thousands of notices were temporarily suspended on account of the railway strike, they are expected to take effect now that the dispute is settled. The Admiralty has just issued to the Dockyards instructions that for the time being no work except such as has been finally authorized is to be proceeded with unless direct approval is forthcoming from Whitehall in regard to the estimated cost in each case, viz.:—(*a*) Alterations and additions to ships and vessels, yard craft and fleet auxiliaries, whether approved in fleet orders or otherwise; (*b*) alterations and additions to shore establishments, *e.g.*, dockyards, barracks, colleges, etc.; (*c*) new mooring schemes, modifications to mooring schemes, shifting and relaying moorings, purchase of new carts, wagons or other plant, purchase of new machinery, installation of telephones, electric light, or modifications to existing installations; (*d*) no new experiments are to be undertaken without prior approval of the estimate of the cost that may be involved, and no extension of existing experiments beyond the present authorized expenditure is to be undertaken without similar prior approval.—*The Engineer*, 10/10.

NEW PROTECTED LIGHT CRUISER.—Recently there was launched at Messrs. Beardmore's Dalmuir Yard, the name-ship of the *Raleigh* class of protected light cruiser.

Designs for these vessels, which are much heavier than the earlier classes of light cruisers, were prepared during 1915. Intended for ocean work in any part of the world, they are 565 feet long, with a beam of 65 feet, a draught of 17.3 feet, and a displacement of 9750 tons. Originally it had been intended to equip these vessels with machinery developing 60,000 h. p.; but subsequently it was decided to increase the power to 70,000 h. p., considerable modifications being thereby entailed.

Twelve Yarrow-type boilers, working at a pressure of 235 pounds per square inch, are arranged in fours in three boiler rooms. Eight of these boilers, which are in the two forward rooms and of a larger size than those in the after room, are fitted for burning oil fuel only. The four smaller boilers are arranged to use both oil and coal.

The four sets of geared turbines (also constructed by Messrs. Beardsmore) are of the Brown-Curtis type, having four shafts, each of which is driven by a high-pressure and a low-pressure turbine. A cruising-turbine is directly connected to the forward-end of each high-pressure turbine, and is provided with a suitable disconnecting gear. The reduction gearing is arranged in the usual manner, *i. e.*, the high- and low-pressure turbines are placed on opposite sides of the center line of the propeller shafting, and the pinions of each turbine gear with a single wheel bolted on the shaft; the gearing is of the double helical type. Each shaft is fitted with a Michell thrust bearing, supplied with forced lubrication and mounted immediately aft of the gear-box.

The ship is constructed with the large flare necessary to keep the decks dry when running at high speeds in rough weather, and the modified form of "bulge" used for protection against under-water attack.—*The Technical Review*, 10/14.

SUBMERSIBLE BATTLE CRUISERS SAID TO BE FAVORED BY BEATTY.—The political correspondent of the *Evening News* says there probably will be a great change in Great Britain's naval policy with the advent of Vice-Admiral Sir David Beatty as First Sea Lord in succession to Vice-Admiral Sir Rosslyn Wemyss, who resigned last week.

Vice-Admiral Beatty's friends, says the correspondent, declare that he believes the future warship will be an oil-driven submersible battle cruiser, and that the Admiralty's plans may be shaped in accordance with this belief.

The dreadnought will not be altogether eliminated, but it will be considered of secondary importance.—*New York Times*, 10/14.

A PACIFIC BASE.—Lord Jellicoe, in a speech at a reception given him in the Fiji Islands, is reported to have suggested the probability of Suva being used as a naval base by the British warships in the Pacific. The suggestion is interesting, and may well lead to a discussion of the merits of this place in comparison with those of Herbertshohe, the former capital of German New Guinea, which has also been mentioned in this connection. Herbertshohe, captured by an Australian Naval Brigade under Commander J. A. H. Beresford, R. A. N., on September 11, 1914, was the seat of government not only for New Pommern Island, on which it stands, but also for Kaiser Wilhelm's Land, the Bismarck Archipelago, and the Caroline and Marshall Islands, thus indicating that our late enemies must have considered it favorably situated. For the last fifteen years there has been no important British naval base in the Pacific. Singapore was regarded as a rallying place for the three divisions of the Eastern Fleet once a year, but the world situation is now greatly changed, not only by the war but also by the opening of the Panama Canal. Our force on the North and South American stations is as much a Pacific as an Atlantic one, as was indicated by the new boundaries of the foreign stations recently issued. At present, the Fiji Islands come within the limits of the New Zealand station, whereas Herbertshohe or whatever new name is given to it, is included in that assigned to the Royal Australian Navy.—*The Army and Navy Gazette*, 10/18.

WARSHIPS FOR "DRUMMERS."—*England Will Let Them Book for Sailing to Foreign Lands.*—(Associated Press.)—British commercial travelers and the representatives of business houses are to be permitted to take passage aboard every British warship leaving the country for abroad.

This, according to Sir Hamar Greenwood, Under Secretary for Home Affairs, who made the announcement to-day before the Association of British Chambers of Commerce, is "a move unique in the history of the empire."

Sir Hamar said that Walter Hume Long, First Lord of the Admiralty, had given his assent to this special service.—*N. Y. Times*, 10/30.

STRENGTH OF NAVAL PERSONNEL.—The report that the personnel of the navy is to be brought down to 100,000 officers and men is probably well founded. This is not so large a reduction as might at first appear. It is true that the active personnel voted for the financial year 1914-15, or just before the outbreak of war, was 151,000, but this figure was nominal and never actually reached. The numbers actually borne on January 1, 1914, were 144,871, so that the reduction which now appears to be contemplated is equivalent to something over 30 per cent in the pre-war peace strength. Remembering that in 1914 we were faced across the North Sea with a German Navy for which over 73,000 men had been voted, and that this conscript force has been swept away under the peace terms and replaced by a voluntary, long-service personnel which must not exceed a strength of 15,000, it will be seen that 100,000 officers and men on the active list ought to be ample in the present situation. The maximum reached during the war by the mobilization of the various reserves was 450,000, and in the ease with which the total is now being reduced to 100,000 we see again the great wisdom of the policy which created the Royal Naval Reserve, Royal Fleet Reserve and Royal Naval Volunteer Reserve, all of which could be and were considerably expanded during the war by men engaged for temporary service, without affecting the position of the regular *cadre* of our long-service seamen.—*The Army and Navy Gazette*, 10/18.

AUSTRALIAN NAVAL PROGRAM AS ADMIRAL JELLICOE PLANS IT.—Admiral Viscount Jellicoe, whose mission in Australia was the reorganization of the Australian Navy, has completed his report. This provides for the establishment of an Australian naval unit composed of eight modern battle cruisers, twelve light cruisers, twenty-four destroyers, and twelve submarines and supply ships. This program is to be completed in 1923 at a cost of £5,000,000 annually.

It is considered doubtful whether the government will accept these proposals.—*N. Y. Times*, 9/12.

TO DISARM CANADIAN VESSELS.—According to an announcement of the Canadian Department of Marine and Fisheries, it has been decided that the retention of armament on ships of Canadian register will be discontinued forthwith.

Shipowners are advised that the retention of armament on defensively armed merchant ships of Canadian register has been under consideration of the Department of the Naval Service, and that it is considered that guns need not remain on any ships.

With regard to fittings which were necessary, the following is the policy of the Admiralty with regard to British registered ships: "On removing the guns, the gun seating is to remain in ships over 3000 tons gross register, and stiffening to remain in all cases, except in vessels under 1600 tons, where, in the opinion of the naval authorities, it materially affects cargo or passenger accommodation. The stiffening for howitzers may also be removed in all ships if it interferes with cargo or passenger accommodation."

A similar policy for Canadian registered ships is recommended, and it is requested that the Department of the Naval Service be advised as to what action shipowners propose to take in the matter.—*Shipping*, 9/27.

FLOAT 19 SHIPS AT SCAPA FLOW.—Acting Secretary of State Phillips to-day received a dispatch from London stating that as a result of the efforts to raise the German vessels scuttled at Scapa Flow, the battleship *Baden*, the cruisers *Frankfort*, *Nuremberg*, and *Emden*, and fifteen destroyers have been floated and three other destroyers probably will be raised.—*N. Y. Times*, 9/16.

POST-WAR NAVAL POLICY.—When the House of Commons reassembles it is probable that a great majority of the members will return from

their constituencies pledged to support a vigorous policy of retrenchment in national expenditure. The need for strict economy is plain to every eye, and while we do not share the gloomy view that insolvency is only a question of time, we agree that unless the present inordinate drain on our resources is promptly checked we shall find ourselves sailing perilously near the reef of financial disaster. The leaks are many, and every one has his pet theory as to how they may best be stopped. But if precedent goes for anything, the House of Commons will first return its attention to the combatant forces of the State.

When the budgets for the navy, the army, and the air force were promulgated for the current year, astonishment was general at the huge sums demanded on behalf of each of these establishments. As the Peace Treaty had still to be signed, and the military situation in Europe remained obscure, the various estimates were provisionally accepted, though not without demur. Since then the Treaty has been signed, the strength of our Rhine army has been fixed at a single brigade instead of several divisions, and a decision has been reached to withdraw our forces from Russia. Our military commitments have therefore undergone a substantial reduction, and there is reason to hope that the outlay on the army and the air force will in consequence be less heavy than was anticipated at the beginning of the year. For the moment, however, we are principally concerned with the Navy Estimates, which are certain to encounter opposition when they are presented in detail next October or November. The circumstances which have made possible a reduction in the land and aerial armaments should react still more favorably on our naval forces. The German Navy has practically disappeared, since under the Peace Treaty that country forfeits the last of her dreadnoughts, and is left with a mere coast defence fleet comprising a handful of small vessels of obsolete design. As Russia is not in the least likely to enter the lists as a first-class sea power within the calculable future, we are now freed from all embarrassments in northern waters; while the obvious disinclination of both France and Italy to spend money on large naval programs removes the last vestige of doubt as to the stability of our maritime position in Europe. Nor for many years is that position likely to be affected in other quarters of the world by the naval activity of the United States and Japan, which alone among the powers are continuing to build capital ships. In brief, our supremacy in every class of fighting tonnage is so great that no serious risk would be incurred if we suspended construction altogether for a few years. That being so, the Admiralty, we fear, will find it difficult to explain to Parliament why it determined to complete eighty-four of the warships which were in hand when hostilities ended. Some of these eighty-four vessels were so well advanced that it may have been deemed more economical to complete them; others, however, had been on the stocks only a few weeks, and had they been abandoned there and then the loss involved would have been comparatively trivial. If it were desirable to continue naval building at all, we should have preferred to see a second battle-cruiser of the *Hood* class completed instead of the swarm of destroyers and submarines which have admittedly become superfluous. In his speech on the Estimates the First Lord declared that his professional advisers yielded to none in their resolution to effect economies in every possible way. We accept that statement without hesitation, but it does not follow that the House of Commons and the Admiralty will see eye to eye when it comes to formulating our future standard of strength. According to the Admiralty's new scheme of fleet distribution, the fully commissioned force in home waters is to contain ten battleships and five battle-cruisers, with a Home Fleet manned on the nucleus crew principle of six battleships. In the Mediterranean it is proposed to station six fully manned battleships. To these fleets will be attached strong squadrons of cruisers and flotillas of destroyers and submarines. Furthermore, each of the foreign stations is to have a contingent of modern light cruisers. If this program is adhered to, the

future strength of the navy in commissioned units will be twenty-seven capital ships, forty-one light cruisers, and a large number of torpedo craft, irrespective of the Royal Australian Navy. This would be a respectable force even if our interests were menaced by a first-class power; but as, happily, there is no such menace in sight, protests against the maintenance of so many commissioned ships are certain to be heard from many quarters—not necessarily only those in which an adequate navy is always opposed on principle.

Our object in directing attention to the foregoing considerations is not to urge a policy of indiscriminate retrenchment in regard to the navy, but rather to warn the Admiralty of the vulnerable points in the case which it will have to defend against over-zealous economists. If once the suspicion gets abroad that the Admiralty is spending more money than the necessities of the situation warrant, there will be grave danger of a reversion to the niggardly policy which came into effect after the Napoleonic and Crimean wars—to go back no further—when the navy was positively starved, and allowed to decline, both in strength and efficiency, below the minimum compatible with bare safety. It is because we should be the first to deplore such a repetition of ancient mistakes that we venture to express the hope that our naval advisers will see fit to modify their present program in regard to matériel and fleet distribution before it is submitted to Parliament. In ordinary circumstances we should rejoice at the worthy manner in which it is proposed to display the flag in every part of the navigable globe, not from motives of chauvinism, but because we recognize the commercial and political benefits that flow from such a policy. But the present circumstances are extraordinary, and we doubt whether the country is in either the position or the mood to sanction the disbursement of a penny for which no direct return can be guaranteed. In respect of matériel, there are methods by which the efficiency of the fleet can be not only maintained, but increased without the heavy outlay entailed by new construction. The lines of technical development are clearly indicated by war experience. The possibilities of long-range gunnery have not yet been fully explored, neither has there been time to assimilate the lessons we have learned in regard to the best system of protection against gunfire and submarine attack. Ordnance experts tell us that if the guns in our ships had been able to fire at an elevation of 25 or 30 degrees, instead of at only 15 degrees, we should on several occasions have inflicted more damage on the enemy. It is known, too, that Germany secured excellent results with her elongated shells and with the reliable fuse fitted to her armor-piercing projectiles. Moreover, she possessed a marked advantage by reason of the superior mechanical efficiency of her torpedoes and mines. It is careful attention to these technical minutiæ that prepare the ground for decisive results in war, and research work of this kind is not so expensive as new construction.—*The Engineer*, 9/5.

THE PRICE OF ADMIRALTY.—The return of navy losses during the war, which at the request of Colonel Burgoyne has been issued as a Parliamentary paper, is a most useful document in more ways than one. Its figures in regard to the casualties among British war vessels, of which 1069 were lost altogether, bring home to the country how fierce and widespread were the efforts of the enemy to wrest from us the command of the seas. Its details of the various losses give authentic information at last in regard to events which were kept secret while the war was in progress. But, to the naval officer and student, perhaps the most valuable feature in the return is the analysis of the cause of loss, both of warships and auxiliary craft, from which it may be seen what proportion of damage was inflicted on our naval material by submarine, mine and other agency. If there is a fault to be found with this analysis, it is that it might have been a little more detailed. Under the classification of "action" there are to be found such incidents as the night attack by a torpedo-boat which destroyed the

Goliath off Cape Helles. The term "action," however, is usually associated with gunfire, and it would have been interesting to have had separated the numbers of ships which were sunk by torpedoes from destroyers in individual combats. Apart from this, the return is very comprehensive and well arranged, and will prove most useful for purposes of record and reference.

A distinction is naturally drawn between warships of the regular service and auxiliary vessels, and in point of numbers there were 254 of the former and 815 of the latter destroyed. The largest toll in any one class of war vessel was in destroyers, of which 64 were lost, reckoning the *Zulu* and *Nubian*, both damaged and made into one ship, the *Zubian*, as one loss only. There is evidence of the increased use of mines and the growing effectiveness of submarines in the fact that whereas only one destroyer was sunk in 1914 and eight in 1915, the total in 1917 had risen to 23. Submarine losses, 54 in all, also increased in proportion as the war progressed, from four in 1914 to 21 in 1918, but the latter figure included seven boats destroyed at Helsingfors to avoid capture. In other classes of vessels already in commission when war began the battleships lost 13, the battle cruisers three (sunk at Jutland), the cruisers 13, and the light cruisers 12, including the six sunk as blockships at Zeebrugge and Ostend. Turning to the newer classes added during hostilities, the largest total of loss was the 18 sloops destroyed out of the 118 vessels of this type built. Six of the 18 were employed as "special service ships," by which is presumably meant mystery or Q-boats, and, as only seven of the classes were fitted for such work, the proportion of lost vessels was very high. It does not follow, of course, that they were unsuccessful in this respect, for it was part of the game for the Q-boats to stand and be torpedoed themselves in order that they might have a chance of getting to grips with the enemy. Among the armed merchant cruisers, there were 17 casualties; 13 was the unlucky number among armed boarding steamers and coastal motor boats; six monitors and coast defence ships were lost; and also three aircraft carriers. Apparently the greatest degree of immunity was enjoyed by the P-boats, only two being sunk, *P-12* by collision and *P-26* by mine, both in the English channel.

It is not surprising to find the heaviest loss in auxiliary vessels to have been sustained by the hired trawlers, of which 246 were lost, or more than one every week throughout the war. This was by no means the only class to suffer heavily, for there were 244 colliers and 44 oilers destroyed—clear evidence of the manner in which the fuel supply of the navy was singled out for attack by the enemy. In addition, 130 hired drifters, 18 Admiralty trawlers, 18 mine-sweepers, 24 motor launches, 14 tugs, 13 yachts, and 35 other craft of various kinds were sunk. There remain the 29 "special service ships," the names of which conceal many gallant but intriguing episodes. Captain Gordon Campbell's ship, the *Dunraven;* the *Stockforce,* which also earned a V. C. for her Commander, Harold Auten; the *Penshurst,* otherwise *Q-7;* and the *Zylpha,* which Commander McLeod tried so hard to save from foundering after she was torpedoed, may be found in this list, but some of the other 25 names are indeed mysteries. One of them, the *M. J. Hedley,* "capsized and sank while coaling in Barry Docks, Cardiff," on October 4, 1918, perhaps a case of her being over-camouflaged.

There are illuminating figures brought out in the analysis of the causes of loss of the ships of all classes. The submarine was the agency which accounted for the highest proportion of losses, 62 warships and 289 auxiliaries being accounted for thereby. One-half the warships were sloops, armed merchant cruisers and boarding steamers, while no less than two-thirds of the auxiliaries were colliers. It is interesting to note that not one of the five battleships sunk by submarine was lost in the North Sea; the *Triumph* and *Majestic* being sunk at *Gallipoli,* the *Formidable* in the Channel, the *Cornwallis* off Malta, and the *Britannia* off Cape Trafalgar. The next largest toll was claimed by the mine, which destroyed 44 warships and

225 auxiliaries. A heavy ratio of destroyers (20) was mined; while no less than 140 of the auxiliaries in this category were hired trawlers. Under the heading of action 42 warships and 43 auxiliaries (including 32 hired drifters) were accounted for. There were 16 destroyers, of which seven were sunk at Jutland, the *Flirt* and *Paragon* in the Dover raids, the *Simoon* in the affair off the Dutch coast in January, 1917; the *Mary Rose, Strongbow,* and *Partridge* in convoy actions; the *North Star* at the blocking of Zeebrugge, and the *Fairy* after ramming and destroying an enemy submarine in the North Sea, while the damaging of the *Zulu* and *Nubian* counts as one loss. A much higher proportion of ships were lost from accidents of various kinds. Thus 11 warships were destroyed to avoid capture, seven were used as blockships, five had internal explosions, 28 were lost in collision, 22 wrecked and seven by other accidents. There were auxiliaries lost under these heads also, and in addition 18 were destroyed by fire. In the category of losses from unknown causes appear 21 submarines, five other warships and 31 auxiliaries. With its full index and admirable arrangement this return will be found to repay study and to form the basis of many interesting deductions. It does not, of course, deal with the personnel lost in the ships, so that there is no means of knowing which form of attack resulted in the highest ratio of loss in officers and men. What would be interesting, however, would be similar statements in respect of the losses of the Allied and Associated Powers in the war, and also of those of the enemy. It would then be seen how great a sacrifice, comparatively speaking, the seamen of this Empire had to make as the price of Admiralty.—*The Army and Navy Gazette,* 10/4.

THE NAVY AND THE FUTURE.—The month of September bids fair to be notable in the history of naval administration. The campaign of economy which the Prime Minister, somewhat belatedly, started on the last day of August, and which has found support in many unexpected quarters, must of course leave its mark on the navy, and, if appearances are worth anything, an indelible one. The aim of those who have to execute the necessary reforms should be to cut down everywhere as drastically as possible, so long as there are preserved intact—

(1) The fighting efficiency of the navy; and
(2) Its instant readiness for war.

This was the principle of the economic reforms effected by Lord Fisher when he came to the Admiralty in 1904. This should be the principle of the reforms which Mr. Long and his colleagues have now to carry out.

Lord Beatty at the Lower Deck banquet at Portsmouth on Monday indicated clearly the line which retrenchment in our naval expenditure should take. He views the matter from the standpoint of the naval officer enlightened and educated by war experience. Acknowledging that the era of economy which has now set in was inevitable, he hopes that the reductions made will not entail injustice and that they will afford an adequate assurance for the security of our interests over all the seas. He reminded those present on this memorable occasion—and his words should find a wide echo outside—that the efficiency of the navy was the foremost necessity, and that its maintenance in the future, as in the past, must depend upon the navy itself. It must be remembered, however, that an efficient navy, though depending mainly on the training and discipline of the fleet, also rests on a foundation of efficient material—on a sufficiency of the very latest and best appliances of war which the country can provide. Admittedly, this is an age of change. The teaching of the war is manifestly that the old weapons, even those of comparatively late date, are being superseded by the newer ones which are the outcome of science and invention. What, then, must be in the minds of all who are looking to the future, so far as the navy is concerned, is the need for research and experiment—the necessity for harnessing to the purposes of naval war everything that the best brains in the nation can evolve. The progress and develop-

ment of the conquest of the air must have its effect upon the material of sea warfare, and complementary development and progress must follow in the latter if what we have been accustomed to call the command of the sea is still to be preserved.

We have arrived, then, at an era of experiment which should progress hand in hand with our era of economy, and thus the reductions of which Lord Beatty spoke must not only be carried out in an equitable spirit but with an unprejudiced mind. The navy, for instance, has been drastically cut down, as any one can discover who compares the number of capital ships in full commission to-day with the number in 1914. Over 150 destroyers and torpedo-boats have been sold or scrapped, and this week the placing of 52 submarines on the sale list is announced. And there is still more to be done in this direction. But there has been no such reduction in the numbers employed in the civil departments of the Admiralty. The personnel at Whitehall increased sixfold during the war, from something over 1500 to over 9000, which was perhaps natural and inevitable, but here in September, 1919, it is officially announced that *three months hence* the total will have been reduced, not to pre-war strength or anything like it, but by 1000, with a further reduction of 2000 by *next March*, when there will still be 5000 employed or three times as many as in 1914. The Admiralty personnel in 1914 occupied 12 pages of the *Navy List;* it still occupies 27 pages. Some of the new departments could surely be dispensed with altogether; all could certainly be reduced; in some there is not a single naval officer employed. Such letters and articles as Lord Fisher has published have an enormous value in this connection. Emphasizing his doctrine that economy is the soul of efficiency, and that every penny not spent on an efficient fighting ship and man is a penny taken from the day of battle, he tells, in his inimitable way, of chairs and blankets in store at the dockyards, which could not fight, but required fighting men to look after them. Then there was a paraphernalia of clerks and auditors looking after these, and then a Board of Works to look after them, and pensions for all—besides houses to house the pension distributors. Let Mr. Long get to work vigorously among such parasitic growths on shore which absorb money voted for the navy. This is a far more fruitful field for economy than still further reductions in the seagoing squadrons, in which gunnery training and general efficiency must be maintained.—*The Army and Navy Gazette*, 9/27.

"LUSITANIA" MAY BE RAISED.—The possibility of raising the *Lusitania* is now under discussion, and active steps in this direction may be undertaken if the opinion of salvage experts who have been invited to study the problem is as favorable as there is reason to anticipate. The *Lusitania* lies at a considerable depth off the Irish coast, and has been submerged for four and a half years. Her huge size would complicate the salvage operations, but it is believed that she could be lifted and moved into shallow water by the aid of flexible pontoons, which, when inflated with air, develop a buoyancy one hundred times greater than their own weight. Expert opinion is inclined to view the raising of the *Lusitania* as a practicable proposition if the financial outlay is deemed worth while.—*Shipping*, 10/29.

JAPAN

BIG CRUISERS FOR JAPAN.—According to Japanese newspapers, the government has decided to build two battle cruisers and twenty-two other warships commencing the next fiscal year and the estimates for these ships will be submitted to the next session of the Diet for approval. The battle cruisers will be the 40,000-ton class and their cost of construction is estimated at 120,000,000 yen (about $60,000,000). In addition, there will be three light cruisers, six destroyers, twelve submarines and three river gunboats.

The disbursement is to be spread over three years from the next fiscal year. The building of two 40,000-ton battle cruisers is for the purpose of completing the "eight-and-eight" squadron which has been decided upon by Japan as necessary for the defence of the country.—*N. Y. Times*, 10/16.

AEROPLANES, JAPANESE NAVY.—Information has been received that there are about 20 planes at the Yokosuka Naval Station, all but one in bad repair. There are now building three aeroplane engines at that station. Some of the mechanics belonging to the French mission have been retained for another year. It is said that German mechanics will be brought over.

Mitsui is rumored to own the Standard Airplane Plant at Elizabeth, N. J., which they plan to move to Japan. This firm also has a plant at Plainfield, N. J., and tried to buy the Wright-Martin plant at New Brunswick, N. J. Representatives of this firm are now in Berlin studying airplane construction.

Mogi & Company also have men there for that purpose, and are contemplating starting a factory in Japan.

LARGEST MOTOR FACTORY IN JAPAN.—The Arsenal which has been in course of construction at Chikusa, a suburb of Nagoya, is now partially completed, and the motor factories previously established at the Tokyo and Atsuta Arsenals are to be removed to this new location, where motors for aeroplanes and army automobiles are to be made. The authorities in charge expect to begin the manufacture of motors by the end of this year, although the construction of the Arsenal buildings will not be finished until March, 1923. When completed this plant will be the biggest motor factory in Japan.—*Mainichi Shimbun, a Japanese newspaper*, 8/26.

THE IMPERIAL POWDER COMPANY.—This company, which is being promoted by Mr. Eppei Miura, M. P. for Aichi Prefecture, has decided upon Taketoyo as the place for its factory. Ground covering 400,000 tsubo (326.77 acres) near Rokkozan Hill in Taketoyo has been selected for purchase, some of the land owners having already concluded agreements to sell.

The company is capitalized at M10,000,000 ($4,985,000) divided into 200,000 shares, only 15,000 of which will be open for public subscription, the remainder having been taken up by interests connected with the Tokyo Gas Company.

The company will make dynamite for use in mining, fishing, and public works, and also smokeless powder for military use, provided this is sanctioned by the War Department. However, besides making dynamite and powder, the company will manufacture chemicals and dye-stuffs for industrial use.—*Nagoya Shimbun*, 8/13.

THE NAVY FUEL OIL INVESTIGATION.—Our navy is at present using a mixture of crude petroleum and coal. Comparing the use of coal with the use of petroleum, firstly petroleum does not take up as much space as does coal, secondly it is rather cheap in price, and thirdly it produces three times as great a horsepower. Though the use of crude petroleum is necessary for us, we feel uneasy to see the declining tendency of the yearly oil production in Japan. The oil field has an unknown capacity at present, but our Navy Department will continue the work until 1920, continuing work which was begun in 1918 and 1919 budgets, by using the established amount of yen 30,468. If the trial digging is successful, it is said that we shall have no worry on the fuel question.—*Hochi, a Japanese newspaper*, 7/18.

INCREASE OF PETROLEUM IMPORTS.—Recently, in opposition to the decrease of our domestic petroleum production, the importation from America and the South Seas has increased. At present the Yokohama Standard Oil Branch has imported 500,000 gallons of oil at Yokohama by its oil tanker

Tamaru. The petroleum kept in the Yokohama bonded warehouse has reached 599,796 gallons (September, 1919).

Until last year six-tenths of the oil used in Japan was of domestic production while four-tenths was imported. The position is now reversed and only four-tenths of the oil consumed is domestic.

About nine-tenths of all imported petroleum comes from the United States and one-tenth from the islands of Java and Sumatra. The oil from the South Sea Islands is imported by the Rising Sun Oil Company of Japan.—*Osaki Asahi, a Japanese newspaper,* 9/30.

LARGE ORDERS FOR METALS PLACED WITH AMERICAN FIRMS.—Sixty thousand tons heavy steel plate, widths to 110 inches, ½ inch-1¾ inches thick, have been ordered from United States firms such as United States Steel, Inland Steel Corporation, Otis Steel Company, Jones & Loughlin, Bethlehem Steel Company. Mitsubishi has ordered 20,000 tons of heavy plate, suitable for battleships. Asano the same amount of structural and steel plate (commercial use). Prices are above market price and specify immediate delivery. Mogi & Company have ordered 12,800 tons of heavy plate (battleship weight) under like conditions.

Mogi & Company have ordered 20,000 cases tin plate and 1000 tons steel bars at any price if promptly delivered.

Two thousand tons steel bars have been ordered by Itoh & Company, Osaka.

Two thousand tons black sheets (dynamo purposes) have also been ordered by Itoh, at $10.00 per ton above market price.

THE SHANTUNG QUESTION, "DEMAND OR ENTREATY?"—The American request for another declaration regarding the return of Shantung to China is either an entreaty to Japan or an interference and coercion. If the Japanese authorities act wrongly the impression will be created that Japan's diplomacy is at the beck and call of America, and the Chinese will have greater contempt for this country. If President Wilson's request is due simply to a desire to overcome the opposition of the Republicans, it is an entreaty, but if the request is based on the plea that the assurances so far made by Japan are insufficient, it is an interference with Japan's rights and an oppression on her.

So far as is compatible with Japan's prestige and rights, we may entertain President Wilson's entreaty, if such is his request, with a view to helping him to extricate himself from a difficult position, but we should never allow our prestige to be damaged.—*Osaka Mainichi,* 9/10.

THE NAVY GRAND MANEUVERS.—Our Grand Navy maneuvers which were held from the middle to the end of October of this year, under the resident General of His Majesty, the Field Marshal Commander-in-Chief was the first maneuver in Japan since the European War. The scope of the maneuvers extended from the main island of Japan to the South Seas.

The squadrons participating were as follows:

(a) Combined Squadron under Admiral Yamashita.
(b) Training Squadron under Vice-Admiral Nakano.
(c) Second Despatch Squadron under Vice-Admiral Hidaka.
(d) All other squadrons which belong to Yokosuka, Kure, Maizuru, Bagoon, Ominato, Ryojun and Chinkai.

—*Yorozu, a Japanese newspaper.*

BLAST ON JAPANESE WARSHIP KILLS 14.—The maneuvers of the entire Japanese Navy, in which the Emperor participated, were marred by an explosion to-day on the battleship *Hyuga* in Tokio Bay. Fourteen men were killed and thirty injured. The Emperor was aboard the battleship *Settsu.*

The maneuvers, which were the most elaborate in the history of the navy, included mimic battles and airplane attacks on coastal cities.—*N. Y. Times,* 10/31.

GRADUATES FROM NAVAL SCHOOLS.—On 9th October 118 naval cadets were graduated from the Naval Academy at Etajima upon completing the three-year course. They go to sea in a Practice Squadron—as midshipmen—for about seven months, being promoted at the end of that time to sub-lieutenant.

On the 11th October 48 naval cadets (Engineering) were graduated from a three-year course in Engineering at Yokosuka Engineering College. They, too, will go to a practice squadron and will get the same promotion.

The ages of entrance for the Naval Academy is 16 to 19. For Yokosuka Engineering School it is 16 to 20. The course at Yokosuka is three years and four months. At Naval Academy it is three years.

UNITED STATES

NAVY DEPARTMENT—BUREAU OF CONSTRUCTION AND REPAIR

VESSELS UNDER CONSTRUCTION, UNITED STATES NAVY—DEGREE OF COMPLETION, AS REPORTED OCTOBER 31, 1919

Type, number and name	Contractor	Per cent of completion			
		Nov. 1, 1919		Oct. 1, 1919	
		Total	On ship	Total	On ship
Battleships					
43 Tennessee	New York Navy Yard	91.2	87.2	87.9	83.4
44 California	Mare Island Navy Yard	80.3	72.9	76.5	68.6
45 Colorado	New York S. B. Co.	34.9	18.1	32.5	13.2
46 Maryland	Newport News S. B. & D. D. Co.	56.	49.3	54.3	46.5
47 Washington	New York S. B. Co.	34.4	17.2	31.2	11.8
48 West Virginia	Newport News S. B. & D. D. Co.	26.3	2.6	26.3	2.5
49 South Dakota	New York Navy Yard	Material being ordered.			
50 Indiana	New York Navy Yard				
51 Montana	Mare Island Navy Yard				
52 North Carolina	Norfolk Navy Yard				
53 Iowa	Newport News S. B. & D. D. Co.				
54 Massachusetts	Beth. S. B. Co. (Fore River)	0.	0.	0.	0.
Battle Cruisers					
1 Lexington	Beth. S. B. Co. (Fore River)	Preliminary plans completed and furnished to builders. Work on detailed plans resumed.			
2 Constellation	Newport News S. B. & D. D. Co.				
3 Saratoga	New York S. B. Co.				
4 Ranger	Newport News S. B. & D. D. Co.				
5 Constitution	Phila. Navy Yard				
6 United States	Phila. Navy Yard				
Scout Cruisers					
4	Todd D. D. & Const. Co.	*32.	10.6	32.	10.6
5	Todd D. D. & Const. Co.	*29.9	8.9	29.9	8.9
6	Todd D. D. & Const. Co.	*23.8	1.8	23.8	1.8
7	Beth. S. B. Co. (Fore River)	2.	1.2	0.	0.
8	Beth. S. B. Co. (Fore River)	2.	1.2	0.	0.
9	Wm. Cramp & Sons Co.	17.	....	16.	....
10	Wm. Cramp & Sons Co.	17.	....	16.	....
11	Wm. Cramp & Sons Co.	6.	....	5.	....
12	Wm. Cramp & Sons Co.	6.	....	5.	....
13	Wm. Cramp & Sons Co.	6.	....	5.	....
Miscellaneous					
Fuel Ship No. 16, Brazos	Boston Navy Yard	Del'd. 10	31/19	98.8	98.7
Fuel Ship No. 17, Neches	Boston Navy Yard	38.9	29.1	33.4	23.1
Fuel Ship No. 18, Pecos	Boston Navy Yard	17.5	.2	16.7	.2
Gunboat No. 21, Asheville	Charleston Navy Yard	90.	87.	86.	83.
Gunboat No. 22, Asheville	Charleston Navy Yard	7.7	5.7	6.5	5.5
Hospital Ship No. 1, Relief	Phila. Navy Yard	57.	52.5	53.5	48.5
Amm. Ship No. 1, Pyro	Puget Sound Navy Yard	98.	96.	97.	93.
Amm. Ship No. 2, Nitro	Puget Sound Navy Yard	73.	59.	68.	54.
Rep. Ship No. 1, Medusa	Puget Sound Navy Yard	12.	0.	7.	0.
Destroyer Tender No. 3, Dobbin	Phila. Navy Yard	4.3	1.5	1.3	.5

* No progress on account of strike.

There are 125 destroyers, 54 submarines, 3 mine sweepers, 12 seagoing tugs, 7 harbor tugs, 9 oil tankers and 1 Ford eagle in various stages of completion.

There were completed and delivered to the Navy Department during the month of October 11 destroyers, 4 submarines, 3 mine sweepers, 2 seagoing tugs, 2 oil tankers and 23 Ford eagles.

There are in addition 12 destroyers and 10 submarines authorized, but not under construction or contract. Miscellaneous vessels authorized but not under construction or contract (3): 1 submarine tender No. 3, 1 destroyer tender No. 4, and 1 transport No. 2.

NAVAL POLICY

IS OUR NAVY IN PERIL?—A situation has arisen in the United States Navy which, unless it be met and mastered, threatens to undermine its efficiency, and this at the very time when it has reached the highest state of efficiency in its long and honorable history. We refer, of course, to the serious crisis with which the navy is threatened, if, indeed, the crisis has not already come, with regard to its personnel, and by its personnel we refer to both officers and men.

It is well known that the demands of the war resulted in a vast increase, both in the number of ships in commission and under construction, and in the personnel necessary to man them; and it is also known that immediately upon the signing of the armistice steps were taken to put a large number of ships out of commission and gradually reduce the personnel to the requirements of a peace-time basis. So urgent were the appeals of the reserve force to be permitted to return to civil life, that the pendulum has swung too far, it seems to us, in this direction, with the result that our navy is already under-manned and promises to be even more badly undermanned in the near future, unless very strenuous steps are taken to stimulate enlistment.

We confess to having been greatly disappointed to find how few of the enlisted men in the reserves were sufficiently enamored of the naval service to make it their permanent calling. We had hoped that thousands of these young men would feel the lure of a life upon the sea, particularly when it meant service under the flag in a navy which had won such high distinction in the great world war. Of course, the great majority of the reserves joined the navy in order to help their country in the great emergency, and now that the danger is past, they feel that they are justified in returning to their jobs in civil life. We still believe, however, that the demobilized reserve forces will prove to be a fruitful recruiting ground, when the natural desire to get back to friends and familiar surroundings has been satisfied.

Undoubtedly, the most powerful factor in bringing about the present crisis is the enormously increased cost of living and the greatly enlarged salaries and pay, which is one of the legacies of the war. How seriously this matter is affecting the officers is shown by the fact that, several weeks ago, it was stated that over fifty officers had sent in their resignations and were living in hopes that they would be acted upon favorably. If, as statistics furnished by government officials state, the purchasing power of the dollar has decreased 45 per cent, it will be understood that the question of maintaining themselves on board ship and their families on shore, is a far more serious problem than it was in pre-war days. So far as the men are concerned, it needs no argument to prove that the great increase in the pay of labor which has taken place has rendered life in the navy, judged from an economic standpoint, far less attractive than it was. Take this as a single instance: one of the contracting firms that is building our subways recently informed us that the unskilled laborer, who before the war received $1.75 a day, now receives $4.00; and we know that skilled labor pay has risen from $6.00 to $8.00 a day and upwards.

Now these are the facts and it is for Congress to determine how it will meet the situation. Service in the navy is just as noble a profession as ever it was, and for the enlisted man, at least, it is far more comfortable than it was in the last decade. Something must be done or we must be content to see our navy shrink to a point where the interests and the dignity of the United States will be very seriously imperilled. Battleships are under-manned and we would not dare to state how many of our destroyers and other of the smaller craft are swinging at their moorings or tied up at a dock, with not even sufficient men to give them decent care.—*Scientific American*, 10/18.

ESTABLISHMENT OF PACIFIC FLEET.—Criticism of the establishment of the United States Pacific Fleet appears in an editorial in the October issue of the *World's Work*, under the heading, "The Navy Repudiates Admiral Mahan." A navy officer in a position to know ultimately the reasons which led up to the organization of the Pacific Fleet commented on this in an interview defending the Navy Department's action in the matter. The *World's Work* holds that "Mr. Daniels has done precisely the thing against which Admiral Mahan warned ten years ago," and has departed from the principle of concentration which Admiral Mahan contended was the basis of naval strategy. The navy officer we quote said:

"The decision to organize the Atlantic and Pacific fleets of equal strength is based on strategical and administrative reasons that are absolutely sound. The result of organizing two powerful fleets, one in the Atlantic and one in the Pacific, will undoubtedly greatly improve the efficiency of the navy as a whole." This, as Secretary Daniels stated at the time of the fleet reorganization, is expected to result from greater opportunities for carrying on war-problem exercises on a large scale from the spirit of competition in target practice, engineering records and other various forms of fleet exercises and training. He continued:

"It is a mistake to regard the navy as being 'divided' in the sense that the two fleets are widely separated and, therefore, do not support each other. The fleets are not widely separated for we now have the Panama Canal, which permits the two fleets, at all times, to be in close touch with each other. Either fleet could be sent from the main strategical positions on one coast to those positions on the other coast within a period of seven days; a period less than that required for an enemy of any important strength to attack either of our seacoasts. In fact this plan greatly increases the protection of each coast and therefore insures the greater protection of the nation as a whole. Protection of either of our long coast lines not only depends upon the ships themselves, but very materially upon the establishment, size and location of naval bases and navy yards. Such bases will only be properly developed when they are used by a large force of ships during peace times.

"The general principle enunciated by Admiral Mahan that the division of a naval force necessarily weakens the strength of the entire force as it enables the enemy to attack one part of the divided force, is true. The result of the division of the British Navy in the Revolutionary War and the Russian Navy in the Russo-Japanese War illustrate this principle. Whether or not the organization of two fleets in the American Navy violates this principle is a question. In my opinion it is only violated when a force is so divided and so widely separated that the two or more parts cannot support each other. Our Atlantic and Pacific fleets are not thus widely separated. They are so close at all times that one can come to the immediate assistance of the other in case of any impending danger. Strategically, therefore, the new organization does not offend against the principles as enunciated by Admiral Mahan. Consolidation of the two fleets into one was foreseen and it will be carried out in exercises which will combine the two fleets in one. The divisions of the two fleets bear certain serial numbers, consequently when they come together each division already

has its assigned place in the battle formation. Orders also have been given designating which of the fleet commanders shall be in supreme command of the combined fleet. In other words, the admirals commanding the different units of each fleet know exactly what the position of their divisions of ships would be in the battle formation of the combined fleet. Only recently was it possible to organize the two fleets, because two essentials were necessary, one the Panama Canal, the other a sufficient number of various types of ships in the navy to enable us to organize two fleets consisting of all the essential types of vessels to make each fleet a properly balanced fighting force. In my opinion there is no sound argument which can be advanced against the new organization of our sea power, while there are very many reasons which justify it."—*Army and Navy Journal*, 10/11.

AVIATION INSTRUCTION AT NAVAL ACADEMY.—Recognition of the desirability of furnishing the ground work, at least, of military aviation in the established military and naval academies, so frequently expressed by army and navy officers who discuss the relative importance of the new services which have come out of the World War, has at last been extended by the U. S. Naval Academy, however. The suggestion originated with Capt. Thomas T. Craven, director of aviation in the office of Naval Operations, Navy Department, and it has been approved by Rear Admiral A. H. Scales, Superintendent of the Naval Academy. In consequence it is proposed to incorporate in the courses at the academy subjects having to do with aeronautics. In outline the plan does not go very deeply into the theory of aeronautics, but in certain courses there will be an amplification particularly helpful in the mastery of aeronautical science. For example, in physics and chemistry and in the study of gases amplification would be simple; in mechanics the plan would embrace the problem of structure; in navigation, the variations incidental to the navigation of aircraft; in gunnery, aerial bombing and marksmanship from aircraft. In addition it is proposed to give the first class a series of lectures on kite balloons, the operation of dirigibles and seaplanes.

In connection with this plan of amplification of courses to incorporate the fundamentals of aeronautics, there is now in process of consolidation a complete exhibit of aviation material which will be installed at the Naval Academy. This exhibit will embrace models of heavier-than-air and lighter-than-air aircraft, motors, instruments covering meteorology and navigation, armament, hydrogen, helium and general accessories. Although the plan means a very modest beginning in the fundamentals of aeronautics, it is confidently believed that it will justify itself and warrant expansion as the plan is developed. It is recognized, particularly by the line officers of the navy, that the progress of aeronautics as applied to sea power must come up through the regular service and that the navigators of lighter-than-air craft and the pilots of heavier-than-air aircraft must furnish the nucleus from which expansion is possible in time of emergency. Training of navigators and pilots, it is believed, can never be incorporated with the academic work of the midshipman, but will come after graduation and experience and seasoning at sea through instruction at the abundantly well-equipped navy air station at Pensacola, Fla. Officers view with approval the outline for amplifying the courses at the Naval Academy to embrace aeronautics, and are practically a unit in conviction that navy air service is distinctly a naval problem.—*Army and Navy Journal*, 11/1.

MATÉRIEL

FOREIGN AIRPLANES FOR U. S. N. SHIPS.—Negotiations of the Navy Department with the War Department with regard to procuring Sopwith strutters, Sopwith camels or Nieuport airplanes for shipboard use has resulted in the shipment to the navy airplane factory at Philadelphia of

approximately 30 machines. These airplanes will be overhauled at the factory and will be fitted with flotation gear. It is expected that 16 will be ready for assignment to ships about January 1.—*Army and Navy Journal*, 10/25.

STATUS OF PLANES AND ENGINES.—The Air Service on October 15, reported 9586 planes and 32,033 engines of all types on hand; 54 per cent of the planes and 57 per cent of the engines were of the active class. Of the active class of planes 337 were in commission, 4091 in reserve, 739 out of commission; total, 5167.—*Army and Navy Journal*, 11/1.

THE UNITED STATES NAVY.—The Acting Secretary of the Navy, says *The Iron Age*, under date Washington, September 1, desires an enlarged appropriation. He asks Congress for an additional $18,900,000 for navy repair and construction work. Two motives have inspired this request. The first is the seriousness of the international situation, including the delicacy of the Ameircan-Japanese relations. The second is the fact that unless this additional appropriation is made, work would have to be cut down in many navy yards. "The Chief of Naval Operations, who is charged with the operations of the fleet and with preparation and readiness of plans for its use in war," says the Acting Secretary, "has stated that in his professional opinion he considers it important, if not urgent, that every fighting unit of the fleet should be put in fighting condition at the earliest possible moment, and that if the appropriations are not adequate for accomplishing this, steps should be taken to have them augmented to the extent estimated to be necessary. While it is no more important or urgent at this time than when the current appropriations were in the course of making, it cannot be denied that the opinion of the Chief of Naval Operations is fundamentally sound."—*Engineering*, 10/3.

NAVY WILL DEVELOP ALASKA COAL FIELDS.—Twenty-eight million tons of coal suitable for naval use is in the Matanuska field, according to the report of the Navy Department commission, which recently completed an exhaustive survey. The information is of particular value since the establishment of the Pacific fleet which can use the northern supply without the necessity of transporting the coal through the Panama Canal. The report, which has not yet been made public, recommends that the coal be brought to the seaboard at Seward and Anchorage.—*The Naval Monthly*, Oct., 1919.

DESTROYER "CHANDLED" DEVELOPS HIGH SPEED ON TRIALS.—The destroyer *Chandled* attained a speed of 36.32 knots on her standardization trial on the Rockland, Me., course on August 21. She averaged 35.64 knots on her five top-speed runs. The vessel develops 28,032 horsepower. —*The Naval Monthly*, October, 1919.

SUBMARINE "AA-2" COMPLETES TRIAL TRIP WITH HIGH SPEED.—The submarine *AA-2*, the latest of the U. S. cruising submarines, was launched at the Fore River yards of the Bethlehem Steel Corporation at Quincy, Mass., on September 6. The submarine is 370 feet long and said to be the fastest Diesel-engined boat afloat, with a surface speed of 20.8 knots, made on her trial trip, and a submerged speed of 13 knots. She has a cruising radius of 7000 miles. The ship has a tonnage of 1150, the next being the *S* type of 850 tons.—*The Naval Monthly*, October, 1919.

PERSONNEL

NAVY SHORT 64,794 ENLISTED MEN.—The enlisted personnel of the U. S. Navy on October 20 was 117,782, a loss of 565 in the week ending that day. Of this total 8768 were reservists. As the authorized strength

is 191,000 men, the navy is short 64,794 in enlisted personnel. Conditions relative to undermanned ships have grown no better in the last few weeks. The U. S. S. *George Washington,* which is soon to sail for France with the King and Queen of the Belgians, is short 400 firemen and seamen, and Admiral Wilson, commanding the Atlantic Fleet, has been called upon to supply the shortage. Orders issued to man twenty-one tankers and colliers resulted in a supply of men for only eight of these ships, the men being taken from the battleships and cruisers. It is likely that the U. S. S. *Delaware* will be assigned to the duty of taking to Italy the body of the late Italian Ambassador, Count V. Macchi di Cellere, who died this week in Washington.—*Army and Navy Journal,* 10/25.

NAVY RECRUITING CONTINUES FALLING OFF.—The week ended October 16 brought a total of 1491 recruits to the navy, a loss of 123 over the previous week. The six divisions reported these totals: New England, 184; Eastern, 535; Central, 339; Southern, 134; Southwestern, 138; Western, 143. From October 9 to October 16 the Pacific Fleet reported no enlistments and the Atlantic Fleet 18. Only 45 reservists transferred to the Regular Navy and there was a total of 200 re-enlistments during the week.—*Army and Navy Journal,* 10/25.

NAVY SCHOOL OF METEOROLOGY AND AEROLOGY.—The establishment of a school for training of enlisted men of the U. S. Navy in meteorology and aerology was announced October 21 at the Navy Department. The school will be located at the Naval Air Station, Pensacola, Fla., and the course will be four months. While it will start with a capacity of only twelve students, expansion is provided for. The first class will open November 1 and the second class December 1, and new classes will be inducted into the school as each class is graduated. Requirements for candidates are at least two years in a recognized high school or its equivalent, and it is desirable that candidates have a knowledge of elementary physics, mathematics and physical geography. All transfers, which will be restricted to candidates having at least one year and ten months to serve on current enlistment, will be made by specific order of the Bureau of Navigation. Graduates of the school will be given ratings in accordance with their ability and assigned to duty at the navy weather observation stations operated in connection with the various navy air-stations and on board aircraft tenders.—*Army and Navy Journal,* 10/25.

NAVY LINE OFFICERS' RESIGNATIONS ACCEPTED.—Secretary Daniels issued instructions on October 29 that with one reservation the resignations on file of officers who were graduated from the U. S. Naval Academy should be accepted. The reservation affects officers who have been in the service eight years or less and is based on the ground that on entering the Naval Academy these men signed a contract for eight years and their parents also signed it, and for that reason they should, without question, serve to the end of their contract, four years in the Naval Academy and four in the navy as ensigns. As a matter of fact, due to the war, the officers who come within the eight-year reservation are all in the grade of lieutenant (j. g.) or of lieutenant and it is considered that they have been especially favored and have no good reason for leaving the service, particularly in the matter of pay, which for their grade is more than any raise proposed considering that normally they would still be ensigns. The acceptance of the resignations will affect officers from the grade of commander down, about fifty officers of the Regular Navy approximately. There is some feeling that the Secretary might reconsider his reservation because officers declare that it will be of no benefit to the service, but will affect the morale of the officer personnel to retain dissatisfied elements, whether or not this element may represent only the lower grades. This view comes from officers who, realizing the irksome conditions of the commissioned officers

of the navy due to the existing economic conditions, are deeply concerned that the morale of the service be held as high as is possible at this crucial time and that the department do everything it can to keep the loyal and efficient officers of the navy in a contented frame of mind.—*Army and Navy Journal*, 11/1.

RETIRED OFFICERS ORDERED HOME.—All retired officers of the U. S. Navy now on active duty have been ordered relieved and ordered to their homes. The orders affect some 200 officers all on shore duty, and by November 15 it is expected that all the retired officers will have been relieved. Some of the officers have been occupying important billets, and their places in some instances where experience counts will not be so easy to fill.—*Army and Navy Journal*, 11/1.

NAVAL CLOTHING FACTORY UNIFORMS.—The naval uniform factory at the navy yard, New York, is now prepared to make uniforms for such officers as desire to give orders for them. A number of officers have already been measured and have given orders for uniforms. Only the best material is used. A uniform for an officer from commander down is furnished for $48. Uniforms for officers above the grade of commander cost but a few dollars extra.—*Army and Navy Journal*, 11/1.

NAVY MEDICAL CORPS SHORT 300 OFFICERS.—The Medical Corps of the navy is now 300 short of its permanent authorized officer personnel. Up to October 15 there were 160 resignations accepted or pending, an increase of thirty since the first of the month.—*Army and Navy Journal*, 10/25.

TRAINING OF FLYING PERSONNEL.—In the Navy Department there is an officer here and there who is of the opinion that the greatest aid and comfort from his service given the proponents of a single air service comes from the fact that up to the present time little of a constructive nature had been evolved by the department in the preparation of an adequate flying personnel representative of the Regular Navy. This opinion coincides with that of Regular Army officers of experience in aviation who point out that while last May the Chief of Staff stated that "the Air Service is a fourth arm of equal importance with the other branches of the service," there has been as yet no indication that the War Department had taken steps to realize on the importance of the Air Service, nor to plan for a constant flow of young Regular officers who should be trained as pilots into the Air Service, either from the U. S. Military Academy or from any other army school. These officers, both in the navy and in the army, contend that the appointment of officers from the line to aviation duty will retard rather than assist in the military development of aviation, and minimum results are only to be expected through such a method. Some plan, beginning at either of the established academies, or at a special academy for training in aeronautics, must be adopted, they assert, in order to produce the all-around military officer who, when in the air, is capable of understanding movements on sea or land and of competently co-ordinating his duty with the commander of such movements. "We are paying much attention to the education and vocational training of the enlisted personnel," said an army officer, who added: "There is far more reason for training the officer personnel and educating it in the technical, mechanical and operating sides of aviation."—*Army and Navy Journal*, 11/1.

NAVY INCREASED PAY BILL IN SIGHT.—Final hearings of the subcommittee of the House Committee on Naval Affairs on the bills proposing increased pay for the commissioned and enlisted personnel of the navy will probably be held on Nov. 4. Secretary Daniels and Rear Admiral Thomas J. Cowie, U. S. N., will be heard. It is reported that the committee has the matter so well in hand that it will report a bill in the House when

Congress reconvenes on Dec. 1. It is predicted that the measure will differ radically from the Stiness bill and the draft suggested by officers of the Navy Department.—*Army and Navy Journal*, 11/1.

MERCHANT MARINE

SHIPPING BOARD GETS LINERS.—Formal custody of five of the eight former German passenger ships, title to which is now a subject of diplomatic discussion between the United States and Great Britain, was transferred last week from the War Department through officials of the port of embarkation, to the United States Shipping Board. The ships transferred are the giant liner *Imperator*, the *Mobile* (formerly the *Cleveland*), *Pretoria*, *Prinz Friedrich Wilhelm* and *Zeppelin*, aggregating 111,393 gross tons.

These ships were taken over by the Allied Commission in German ports following the signing of the armistice, and were allotted to the United States to bring troops home from France. The *Imperator* and some of the others were presumed to go to Great Britain and the Cunard and other lines now have in New York more than 1000 men ready to man them. On the day that the *Imperator* was to be turned over to the Cunard line, however, the delivery was interrupted on an order from Washington.

Officials of the United States Shipping Board said that they had no instructions as to the disposition of the ships, but would hold them pending orders, the only difference in so far as their status was concerned being that Shipping Board crews would replace those which have been operating them under the jurisdiction of the army service. It is also probable that they will remain at the army piers until the question as to their disposition is settled.—*Shipping*, 10/22.

AMERICAN MERCHANT FLEET.—The seagoing fleet of American merchant ships of over 1000 gross tons each on August 31, 1919, registered for the foreign trade or enrolled for the coasting trade by sea, as shown by the returns of the Bureau of Navigation, Department of Commerce, under acts of Congress, comprised 2245 ships of 8,100,008 gross tons, of which 1558 of 6,707,820 gross tons were steel steamers, 347 of 840,611 gross tons were wooden steamers, 95 of 180,487 gross tons steel sailing ships or schooner barges, and 245 of 371,099 gross tons wooden sailing ships or schooner barges.—*Shipping*, 10/7.

SHIPS CONSTRUCTED AND OFFICIALLY NUMBERED IN SEPTEMBER.—As might be expected, in view of the many disturbing influences at work in the spheres of commerce and industry and in some measure entirely aside from these because of the natural tendency of the business pendulum to extreme sensitiveness even under normal conditions, a falling off in vessel construction and registration has to be noted for the month of September as compared with that of August. There is nothing in the situation, however, to cause alarm among well-wishers of the permanent maintenance of our shipbuilding achievement.

The Bureau of Navigation, Department of Commerce, reports 200 sailing, steam, gas, and unrigged vessels of 374,165 gross tons built in the United States and officially numbered during the month of September as follows. This compares with 454,887 gross tons in August for 236 vessels. —*Shipping*, 10/22.

HOG ISLAND SHIPYARD OUTPUT.—With the delivery of the *Nobles*, a 7800-d. w. t. freighter, the Hog Island shipyard completed delivery of its first 50 vessels to the United States Shipping Board. The total tonnage delivered is 391,250 d. w. t. This is the world's record for shipbuilding in a single yard.

The total tonnage delivered by the American International Shipbuilding Corporation (Hog Island Shipyard) is 105,705 d. w. t. greater than the

dead weight tons of seagoing vessels delivered from American yards for the year 1916, which was the record pre-war year in ship production. In that year (1916) there were built in all yards in the United States 38 seagoing vessels of 1500 d. w. t. upwards, totaling 285,555 d. w. t.—*United States Bulletin*, 10/13.

SHIPPING BOARD PLANS FOR 1731 OIL BURNERS.—With the completion of the present construction program of the Shipping Board, there will be under the American flag 1731 oil-burning steamers of an aggregate of nearly 10,000,000 dead weight tons. Fuel stations are now being established along the trade routes in the Atlantic and Pacific so that the American ships will be able to make a complete circuit of the world without taking fuel at other than American-owned stations.

A total of 486 oil-burning ships is now in the government merchant fleet, while 67 others have been sold to Americans or reconveyed to their American owners. In addition 636 oil-burning vessels are under construction.—*N. Y. Times*, 11/2.

PRESENT STATUS OF OUR MERCHANT MARINE.—The following work yet remains to be done on our Merchant Marine program:

Completion of vessels launched but not yet delivered, 1,280,483 tons. Completion of vessels whose keels have been laid, 2,190,736 tons. Completion of vessels under contract, 984,407 tons, making a total tonnage on which work yet remains to be done, of 4,455,626 tons.

Of equally, if not greater importance than the construction of ships, is the provision of a well-trained sea-going personnel. At the present time we have 4592 deck officers and 4592 engineering officers. The deck force consists of 15,720 men and the engine and fire room force of 18,720 men. In the steward's department there are 7936 men, making a total personnel in our merchant marine under the Shipping Board, of 51,560.—*Scientific American*, 10/11.

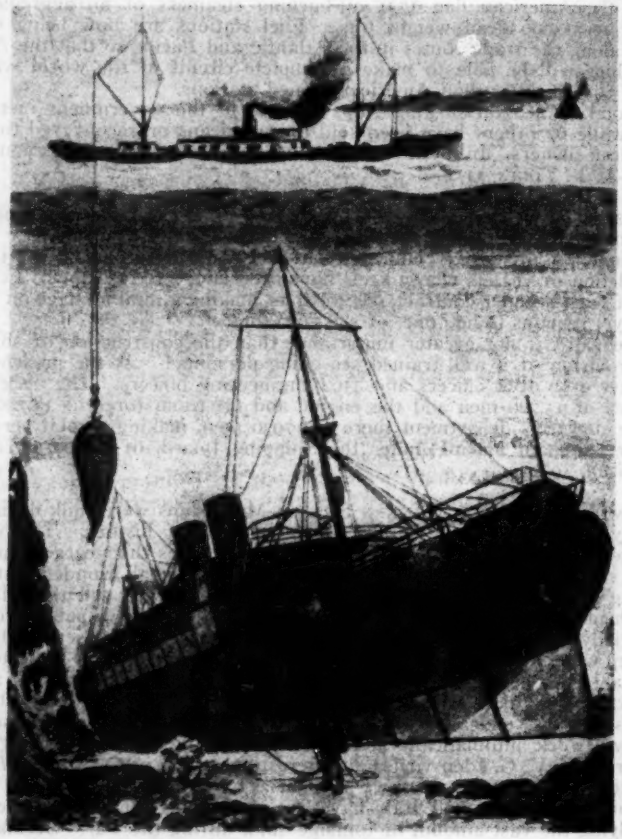
NEW WAYS TO FLOAT SUNKEN SHIPS.—More ships were sunk during the four years of war than in any similar period of history. The vessels themselves are valued in billions; and in many cases their cargoes are still more valuable and are usable if recovered. It is small wonder that ship-salving has suddenly stepped to the front as a business and that all sorts of schemes are being hatched to recover some of this valuable property. Especially is the busy inventor trying to devise a way to raise vessels sunk in deep water—far beyond the limits of depth at which divers hitherto have been able to operate. Some new schemes for accomplishing this aim at protecting the diver against the crushing pressure of the water at these depths. Others endeavor to make this unnecessary by devising machines that will work automatically at these depths, doing away with divers altogether. Mr. V. G. Iden writes an interesting article in the *Marine Review* (Cleveland, October), which we summarize as follows:

"England, France and Italy have shown an active interest in the work of salving the vast amount of tonnage sunk during the war. Germans are also reputed to have ambitions in this direction. During the war our own government undertook some developments along this line, but since the cessation of hostilities our salving has been handed back to private interests. Something between five hundred thousand and a billion dollars worth of ships have been sunk off our coasts. Furthermore a number of American vessels have been sunk in European waters. Although some of our vessels were sunk in foreign waters, the United States has refused to relinquish claim to their ownership and the salvage work attempted on them will undoubtedly be in the interest of American owners.

"National claim to vessels sunk during the war, no matter what their locality, is being advanced by all the maritime nations. The old contention that a nation could claim ownership of nothing sunk outside the three-

mile limit, is being exploded. If the new basis of ownership is adhered to, it is doubtful whether the Germans will ever be permitted to carry out their reputed intention of reclaiming much of the merchant tonnage which their own submarines and mines sunk during the war.

"At the same time, the salving of vessels to-day presents more than the ordinary problems of recovery with which we have had to contend heretofore. Vessels representing great wealth have been sunk in the ocean at



COLLAPSIBLE PONTOONS FOR RAISING SHIPS.

depths much beyond anything divers have worked before. It is claimed that divers cannot work successfully at a depth greater than 80 feet because the water pressure is too great. Inventors have therefore turned their attention to the problem of protecting the diver from the water pressure.

"The Atlanta Engineering Corp., of New York, proposes to build one style of deep-sea armor. The first suit was of cast steel from the waist to the feet with a large cylinder tank encompassing the hips in which it was proposed to carry air bottles. The suit from the waist up was constructed of an aluminum composition. It has been decided that the large

cylinder around the waist made the armor cumbersome, and in the next suit this feature will be eliminated and the trousers made of gun metal. The whole will be built upon the ball and socket principle so as to give freedom to all the limbs of the diver.

"The American Salvage Co., New York, has attempted to eliminate the danger of diving by proposing to use a device constructed upon the

BURROWING MACHINE TO BORE UNDER SUNKEN SHIPS.
It has been tried out by a ship-raising firm of New York.

submarine principle. This is shaped like a ball and the men sent to work on the sunken vessel will work from its interior. It is known as the Sisson deep-sea diving machine, and has been tested in the waters of Long Island Sound. On the front of the machine are four electro-magnets with a pulling power of about two and one-half tons each. These magnets are operated in pairs by a motor within the machine which permits of the machine being moved to a predetermined point along the side of a steel vessel, by energizing and de-energizing the magnets, and using them in con-

junction with the screws. Steel air bottles under high pressure carry enough air for the operators. In case of emergency, the machine is equipped with ballast tanks which can be exhausted, thus permitting the machine to come to the surface of its own buoyancy.

"The plan of operation is more or less as follows: Pontoons of a predetermined size are lowered alongside the wreck. They are equipped with cables placed about two feet apart; each cable has a float, also an expanding hook. These hooks are banded together so that they will face outward or forward. The machine is about neutral in the water, and determines its position by means of the lower propellers; the rear propellers move it forward and the magnetic thrust arm picks up one of the hooks attached to the pontoon. The four electro magnets are then energized and the drill drills a hole and by releasing the two vertical magnets the machine moves over until the hook is directly opposite the hole that has been drilled, the magnetic thrust arm then moves forward and inserts the expansion hook in the hole. This operation is repeated until a sufficient number of pontoons have been attached to the ship to raise it.

"During the war the Navy Department made use of the hydraulic method of passing chains under a vessel with some measure of success. A high power hose was used on a vessel which was not extremely deep. The water pressure at that depth was 23 pounds and the hose threw water under a pressure of 150 pounds. The diver directed the nozzle, which was extremely long, at the sediment under the vessel and when a passage had been blown completely through, the nozzle was disconnected and a cable drawn under. Chains were attached to the end of the cables, and these were later attached to specially constructed pontoons.

"In cases where the ship has settled deep into the sand and mud at the bottom of the ocean it would be impossible to dig under it with either a hose or any other method now in use because as fast as the sand was removed it would fill in again. To meet such a condition as this, the burrowing machine has been invented and is being promoted by the United States Ship Salvage Participating Syndicate of New York. This is a box-like machine which is pulled through the sediment and under the ship by two screw-like blades operating in opposite directions.

"A further adaptation of this burrowing principle has been devised by the same people by an application of the tank which was invented during the war. Instead of two traveling belts, however, this machine has four, two working together in opposite directions. The nose of this machine has a hydraulic spray attachment which will assist the progress of the 'caterpillar' by blowing away sediment. This machine also is operated by hydraulic power and draws chains under the ship.

"The interocean Submarine Engineering Co. hopes to obviate the necessity of using pontoons in deep-sea work by utilizing the water-tight compartments of the sunken vessel. Where this practice is followed it will be necessary to send divers down to seal all the hatches and holes. In the shell of the water-tight compartments a hole will be cut over which is fitted in patented valve plate. Through this valve compressed air can be pumped into the compartment and the water forced out.

"In harbors it is possible to use pontoons and other simpler means of raising a ship, but it becomes increasingly difficult to use pontoons in the ocean. The large pontoons the English have built, however, may be considered somewhat different. These, constructed of cement, are in reality the half sections of a dry dock. It is planned to lower one on either side of a ship, pump the water out and bring her to the surface.

"But after diving for a ship, it is often found necessary to cut away some of the structure in order to get to work on the vessel. Sometimes it has been found utterly impossible to do anything with a sunken ship because it was impossible to cut away certain structures. Merritt & Chapman, of New York, believe they have largely met this problem by the use of an under-water cutting machine. This machine is an adaption of the acetylene cutting flame. It has been patented in this country.

"In the Chapman system of under-water cutting the flame is supported by a constant electric arc. The Germans also have a method where the flame is supported by compressed air and a shield. The flame, however, is started by an electrical spark. The English likewise have a machine to cut underwater, but theirs is an electrical method entirely."

The field for inventors is limited somewhat by the caution of the commercial ship-raising firms, for we read:

"Salvaging work is still progressing along the accepted lines, while inventive genius has been exhausted upon the many ideas advanced for raising the numerous vessels that were torpedoed and mined in the ocean. But daring attempts to raise vessels from the bottom of the ocean will probably not have the sanction and the support of the commercial salvagers for some time to come. They hesitate to work on experiments because such work does not hold profit for them. It is too much of a gamble. Commercial salving must be assured of a reasonable return upon its expenditures.

"Since the war salvage experts have been striving to find a way to do away with diving. If this can be accomplished a great advance will have been made in the art of salving. One of the ideas advanced is known as the DeVito method. Instead of having several pontoons, but two pontoons are used hinged together at each end. These hinges are operated in connection with an air cylinder. When lowered the hinges are wide open and the pontoons will lie on either side of the sunken vessel. Air is then pumped into the cylinder which rises, closing the hinge and bringing the two pontoons close together, clamping them to the ship in a vise-like grip. The grip of the pontoons once established, water is pumped out of the pontoons thereby raising the ship."—*The Literary Digest*, 11/1.

NAVIGATION AND RADIO

FREAKS OF WAR WIRELESS.—Just before the 64-kilometer retreat of the German armies from the strongly entrenched Chemin des Dames position in 1918, the Allied Intelligence Department informed the General Staff the exact positions which would be evacuated. This was in spite of the fact that all the preliminary operations on the Berlin side were carried out with the utmost attempt at secrecy; that every movement up to the final withdrawal had been made at night; and that even divisional commanders in the German ranks were ignorant of the extent of the retreat. Wireless told the story.

No message telling this precious secret was intercepted. The Germans knew far too much to intrust this to errant ether waves. Yet from the enemy's use of wireless equipment the Allies obtained their positive information.

The reasoning behind it was simple, but it was not until 1918 that either side used the process—perhaps for that very reason. Most communication in the front trenches is carried on by telephone. "Buzzers" chit-chat incessantly. Some of their talk is important. More is merely trench gossip. A little is scarehead stuff calculated to start the foe guessing if he happens to be listening in with microphone.

The trench phone equipment is costly. On the German side toward the end of the war it was likewise irreplaceable. Whenever the decision was reached to get out of a certain sector, the Huns had first to move out their phone intruments, wire and stations. From the time this was started until it was fully accomplished, wireless played an increasingly important part. Every phone station gave place to a temporary wireless station, and the chatter, bluff and serious orders in code were sent in this manner for 10 days previous to the final withdrawal.

From previous experience, French, British and American spotters had become familiar with the coincidental increase in the number of wireless messages with the preparation for retreat. So, with this symptom well

developed along a 64-kilometer front on the Chemin des Dames, they had no difficulty in marking off the sector, and even in guessing accurately concerning the time the retreat would begin. Needless to say Allied artillery made the evacuation as difficult as possible.

Another queer situation which arose in the wireless department during the war was known officially for months as the "Nauen-Madrid Buzz." In May, 1916, it appeared for the first time, emanating from Madrid. It was a curious rustle of the spark unlike any message familiar to Allied operators, who of course looked upon it with suspicion and tried to make something out of it. For perhaps five seconds—and sometimes as long as 20—this peculiar phenomenon would occur. Then no more for perhaps a week. Until Nauen developed the same strange quality the buzz was diagnosed simply as an odd manifestation of "static."

But Nauen buzzed. Immediately all the wireless sharps in the Allied ranks tackled the problem. Though there was no direct proof to hand that Nauen also was not bothered by "static," the coincidence was ugly. So many means whereby the Huns obtained precious information concerning secret military matters had been uncovered already, that the Allies had become quite in the habit of regarding anything out of the ordinary as spy work. The best men were put on the job—and were baffled.

It is needless to detail the many theories which were held concerning this mysterious communication—for after the first weeks no one doubted that the buzzing was just this. The solution was reached through pure accident.

In studying foe wireless—which is in code, if important—the practice is to take down the message on a phonograph record. Then it can be decoded at leisure. One of the many dozens of records of the Nauen-Madrid buzz was being run. A young radio officer was attempting to solve the mystery. The spring in the machine ran down, and as he wearily reached forward to wind the box again he stopped, chilled by the excitement of a discovery. With the cylinder revolving at a very low rate something that might be a rapid message in code clicked from the horn!

Throttling down the speed adjuster on the phonograph, he ran the record as slowly as possible. His hunch was justified! There was certainly something there, though it went too fast to be caught.

He wrestled with the problem overnight. Next day he rigged up an electric motor to run his blank cylinder record at a prodigious rate of speed. When the buzzing occurred it was caught. Then when the record was re-run at a moderate rate the message was there! It was decoded shortly, and proved to be part of an important description concerning the disposal of Allied troops.

The secret was simply that at Nauen and Madrid each message was cut into a perforated roll. This was run through the sending apparatus at the speed of four hundred words per minute. Naturally it turned out to be a buzz to anyone not "in the know." At the opposite station they simply took it on the phonograph, and that was all there was to it.

The Allies managed to trace down many spies through the requests made by Nauen. In addition to this a great deal of erroneous information was sent through channels by which it would reach Madrid, and thence Nauen. After this there always was a third party on the line whenever the Germans and their agents in neutral Spain got talking together.—*Scientific American*, 10/11.

WIRELESS BETWEEN UNITED STATES AND GERMANY.—Wireless communication with Germany has been resumed in a limited way by the American Government, according to *Wireless Age*. Business communications between American houses and their agents in Germany are accepted in New York at 44 Whitehall Street, and other points where the navy has district

communication officers for transmittal to the transatlantic wireless stations at the Navy Department there and at Otter Cliffs, Me., where they are dispatched to the receiving station at Nauen, Germany. Similar communications are dispatched from Nauen to the United States receiving stations. Press dispatches to the extent of 500 words from this country and a similar number of words from Germany are also accepted daily.—*Scientific American*, 10/11.

WIRELESS AND SHIPPING.—There is a world-wide movement to increase the use of wireless telegraphy and telephony at sea. Many bills are being prepared or have been passed by foreign parliaments compelling ships to carry wireless. This movement looks to the freeing of wireless telegraphy from the world monopoly which has so largely retarded its more general development. Action is being taken in England and France, as well as in the United States, by the respective governments, to make wireless free. The Australian, British, German and French governments have their own wireless systems. Our own government is reported to possess most effective systems of both wireless telegraphy and telephony which would prove of immense value to our mercantile marine if questions of naval and military policy did not prevent them being disclosed for free public use.—*Shipping*, 9/6.

ENGINEERING

A CHEMIST'S DREAM COME TRUE.—American oil won the war: This statement is at any rate nearer true than most of the similar ones we see. Lord Curzon says "the Allies floated to victory on a sea of oil," and 80 per cent of it, during the last crucial months, came from the United States. That the failure of this source might spell ruin to the Allied cause was realized by no one more than by the Germans, who tried to concentrate their submarine efforts on oil tankers, and with considerable success. Their work gave our engineers something to think about and set on foot experiments in the use of pulverized coal on shipboard, to offset the loss of oil. The installation of pulverized coal burners and oil burners side by side on an experimental vessel suggested the mixture of the two fuels and gave rise to the so-called colloidal combination of coal-dust and oil which is the last word in motor-fuels. An article by Robert G. Skerrett, from which the above facts are taken, contributed by him to *The Rudder* (New York) under the heading that we use, contains additional interesting particulars. We summarize it as follows:

"The inner story of our efforts to maintain a steady movement of oil across the Atlantic reveals how desperate the situation was at times and with what determination and technical cunning certain of our experts set about devising relief of a unique nature. The best of this tale of achievement is that the efforts designed to meet a war crisis have yielded results which are bound to prove of the greatest economic value in the years of reconstruction and in the normal periods of peace. The scientists have evolved a new fuel—a fuel that brings together waste products and thus amplifies tremendously our sources of mechanical power.

"The war had not been long underway before the ravaging U-boat began taking an increasing toll of merchant shipping. To a large extent the foe's advantage was due to the telltale stream of smoke. This emphasized the desirability of smokeless fuel.

"Such was the prevailing status of anti-U-boat preparations when the Submarine Defence Association of New York City was created. This was called into being by a large group of representative underwriters, steamship lines, manufacturers, producers, and technical concerns of one sort or another—all of them civilian interests. One of the very first things attacked for solution by the Submarine Defence Association was the question of smokeless fuel. Without going into this subject at length, it will suffice

for our present purpose to say that particular attention centered before long upon the utilization of pulverized coal.

"The Navy Department had placed at the disposal of the Submarine Defence Association a converted yacht, the U. S. S. *Gem*, for diverse experimental work.

"The furnaces are designed for the burning of fuel oil. Two of the oil burners were removed and two pulverized coal burners substituted; and the tests included the use of coal alone and of coal and oil burned simultaneously from different but neighboring burners.

"The association of oil burners and pulverized coal burners in the same furnace on the U. S. S. *Gem* quite naturally raised the question in the mind of Mr. Lindon W. Bates, chairman of the Engineering Committee of the Submarine Defence Association, Why not combine the oil and pulverized coal and burn them so mixed from the same burner? This query was inspired by an economic problem confronting the Allies which was daily becoming graver. Month by month fuel carriers were being sunk in increasing numbers, and England, France and Italy were sorely distressed lest the supply of liquid fuel fail them.

"As Mr. Bates saw it, the immediate gain, if coal and oil could be combined, would be to reduce the amount of fuel oil to be moved from America to Europe by just that measure of powdered coal which could be supplied from native sources abroad. In other words, his aim was to make every gallon of petroleum perform a greater service and enable oil-burning steam plants to use the mixed combustible without any substantial change in their liquid fuel installations. This was a somewhat ambitious project, because it was fully recognized that the way to success bristled with difficulties. Indeed, many others had essayed the same scheme, but, at best, with results of little practical value. The stumbling block was the law of gravitation which inevitably brought about sooner or later the precipitation of the heavier particles and thus caused the bits of solid carbon to separate from the oil and to settle at the bottom of the containers.

"After months of tireless investigation and hundreds of painstaking tests, a combustible compound was produced, called 'fixateur,' which would do the trick. Twenty pounds of this secret preparation, when added to 2000 pounds of combined fuel oil, pulverized coal, and coal-tar, for instance, will neutralize gravitation and keep the dissimilar ingredients thoroughly mixed for protracted periods. This composite combustible is technically termed colloidal fuel.

"The Submarine Defence Association has declared that colloidal fuel can be utilized for marine steaming purposes under practically the same conditions and with as good results as with the navy high-grade fuel oil. Tests have shown that the colloidal fuel is as smokeless as navy high-grade fuel oil, and yet, by purposely overfiring, it is possible to generate a dense smoke screen when desired. It seems that grades of colloidal fuel may be prepared which, without replenishment, will give a warship or a merchant craft substantially 20 per cent more steaming radius than fuel oil of equal bulk stored in the same tanks!

"It seems that refinery waste—pressure-still residuals—such as oil, wax tailings, crude-oil coke, etc., can be utilized in the preparation of an efficient colloidal fuel. Similarly, coal coke, charcoal, lignites, brown coals, and coal dusts, which are ordinarily deemed of little value for steam raising, can be drawn upon to furnish the needful heat units in the form of solid particles of carbon."

The oil-burning vessel is a money-saver compared with a craft of like engine power which consumes coal. A 10,000-ton vessel on a voyage of 7000 miles requires 1600 tons of coal or only 800 tons of fuel oil, but 640 tons of the new combustible will answer instead of 800 tons of straight fuel oil! The transatlantic freight rate is substantially $50 a ton. Therefore, if we add 160 tons to the cargo-carrying capacity, we obtain an additional revenue on each crossing of $8000! Assuming a ship to make six round

trips each year, the total increase of income thus effected would be $96,000. Then Mr. Skerrett turns to another use of the new fuel that should interest all those who view with concern the steady drain upon our coal and oil supplies which must some day exhaust them. Nearly half our known petroleum supply, in fact, is now gone, and we are using larger and larger quantities every year. He tells us how to save part of it:

"And have we any other reasons for encouraging the use of this new-found economic fuel? Manifestly, colloidal fuel will save us a vast sum each twelvemonth if oil-burning plants on shore use this epoch-making combustible as far as practicable. Indeed, it is inevitable that something of the sort be done if we hope to prolong the life and sufficiency of our domestic petroleum resources. This bears directly upon every phase of our industrial life; touches all forms of transportation and relates to every kind of power-driven craft.

"A short while back the Secretary of the Interior notified the United States Senate that we had withdrawn from our known oil field quite 40 per cent of their estimated original content. With the present trend of consumption, so the United States Geological Survey points out, we shall be consuming crude petroleum a decade hence at the rate of 520,000,000 barrels annually! This brings home to us how necessary it is for us to conserve our native resources, to take steps to save where we can, and to employ substitutes as far as practicable. Colloidal fuel is one amazingly flexible means to this end. The Submarine Defence Association thus emphasizes the conservation of oil that might be effected by adopting colloidal fuel instead: The 2,900,000 barrels now brought to New England, if employed in colloidal fuel, could do the work of nearly 4,000,000 barrels of straight oil, and accomplish this with the marked economies and advantages inherent to producing and applying heat with liquid as against solid fuel. The prodigal waste of oil is sin to be repaid in sorrow. Its conservation and guardianship is the task of those upon whom this world-solemn duty has been unprecedentedly laid. Ways have herein been made straight to do so with injury to none and helpfulness to all."—*The Literary Digest*, 11/1.

A NEW MOTOR FUEL.—Shareholders in Petroleum companies will have received a shock by the statement that an inventor has hit upon a compound which when mixed with water, provides a fuel which can be retailed at fivepence per gallon. There will probably be a slump in petroleum shares if there is any foundation for the statement, and judging from a test which took place on Saturday, at Nottingham, the new fuel would seem to be *au fait accompli*. Several experts attended the test, which is the invention of a South American named Andrade, who is of Portuguese extraction. The fuel is produced by mixing with water a compound known only to the inventor. The test took place in the grounds of Alderman Ball, father of the late Captain Albert Ball, the airman. Alderman Ball has entered into a provisional arrangement with the inventor to secure the European rights. On some of the liquid being poured on to the ground it burned steadily and emitted no smoke. The smell does not resemble that of petrol. Half a bucketful of liquid was afterwards poured into the petrol tank of Mr. Ball's car, which traveled with perfect smoothness and at a high rate of speed. More water was then added, and this seemed, if possible, rather to improve the running of the engine.

Thirty Miles with a Gallon.—Mr. Ball states that the car traveled over 30 miles on one gallon, and that if Andrade's assertions are true a gallon can be manufactured for 5d. Great interest has been aroused among local motor firms by the discovery. Andrade claims that it will prove even more valuable for submarine craft as practically no air is necessary. The inventor has been in this country several weeks, during which time experiments have taken place in the presence of experienced motor experts. The

chemicals are introduced in the form of powders, and minor experiments are reported to have proved very encouraging. Further tests have yet to be made, however, before the new fuel can be considered to have established the claims of the inventor.—*United Service Gazette*, 10/16.

AERONAUTICS

NAVY'S GREAT AIRSHIP HANGAR.—The navy is purchasing its first rigid airship in England at a cost of $2,500,000. To house it a huge hangar is to be erected at Lakehurst, N. J., which will be 800 feet long, 265 feet wide and will have a clear inside height of 174 feet, while the total height from the ground to the peak of the roof will be over 200 feet. The steel framework will be over 6000 tons. Two elevators and several stairways will lead to the roof. The many shops necessary for the maintenance of the airships, will be built in between the great arched trusses that support the roof. Three railroad tracks will run the entire length of the building. The hangar will be large enough to hold one ship of 10,000,000 cubic feet capacity and a smaller one at each side, or two 5,000,000 cubic feet ships side by side.—*Scientific American*, 10/11.

AN AIRSHIP CONSISTS OF 20,000 PARTS.—Some interesting facts regarding the work required in building a large modern airship is given in a recent issue of *The Engineer*, which states that the general problems of design are closely allied to those of naval architecture; although the airship designer must be a highly skilled mechanical engineer, and also must have a knowledge of textile technology. For the work of construction, owing to the multiplicity of parts required, a very efficient shop organization is necessary. In a rigid airship structure, excluding the machinery, there are 20,000 different parts, a total length of structural material of 20 miles, 60 miles of wire, and over 2,000,000 rivets.—*Scientific American*, 10/11.

SPEED IN AIRPLANE TRAVEL.—That very successful airplane designer, Grover C. Loening, once made the surprising but perfectly true statement that the speed requirement for successful commercial aviation is more important to-day than it will be several years from now. In the course of a paper on the value of speed in commercial airplanes, he explained this on the ground that airdromes are less frequent and are more remote from cities than they will be in the future, and, therefore, speaking of the business man, the time from office door in one city to office door in another must include a motor-car ride to the airdrome, which will generally be far longer than the taxicab ride to the station.

Mr. Loening, whose monoplane is one of the fastest machines of the day, shows the significance of higher speed in an analysis of a business man's trip by airplane, from an office in New York to an office in Washington, D. C., by an airplane making 70 miles an hour. From his office in New York to Belmont Park would take about 50 minutes, and from Anacostia landing field to his Washington office, about 30 minutes, making a total of 4 hours and 50 minutes, which is certainly not enough less than the train time to warrant the added expense and trouble of going by the air route. But if the airplane could maintain 170 miles per hour, it would travel from Belmont Park to Anacostia Landing in an hour and a quarter, and with the same connecting trips to offices, the total time from office door to office door would be 2 hours and 35 minutes, which is less than half the train time. Thus a business man could leave his New York office at 8 a. m., reach Washington at 10.35, leave Washington at 2 p. m. and arrive at his office at 4.35.

The above estimate assumes perfect weather conditions with no wind. But let it now be supposed that a 20-mile head wind is blowing. A 70-mile-per-hour machine will take about four and one-half hours for its flight.

making a total of almost six hours, which is longer than the train time; while the 170-mile-per-hour airplane will make its flight at 150 miles per hour, in 1 hour and 28 minutes, making a total time of 2 hours and 48 minutes from office to office. The fast machine is less dependent on the weather.

We are entirely in agreement with Mr. Loening, in his statement that under existing conditions, whatever the future may have in store, very high speed is necessary if inter-city travel is to surpass railroad travel in the matter of time consumed on the total journey.—*Scientific American*, 10/11.

SILENT AIRPLANES.—Information emanating originally from Zurich is to the effect that several big German works, including Krupps, of Essen, are carrying out experiments in the most profound secrecy, with a novel aviation motor, much superior to all designs heretofore known. It is reported that they have constructed a gas turbine, one of the main advantages of which would be to give almost noiseless flight. Giant airplanes capable of carrying 64 people are stated to have been built, equipped with the motor in question.—*Scientific American*, 10/25.

ZEPPELIN AIR SERVICE.—Successful trial flights are reported as having been made by a great Zeppelin, driven by seven motors and able to carry 100 passengers, in addition to the crew. A Berlin source states that this is intended to be the first gun in a regular airship service by a German company, connecting Stockholm and Copenhagen with Berlin, the major object being the assumption of a leading position in Scandinavian affairs, as against British and French rivals.—*Scientific American*, 10/25.

MAYNARD'S FEAT.—Nothing in American aviation has been more thrilling than the achievement of Lieutenant Belvin W. Maynard in twice crossing the continent in a total flying time of about fifty hours.

When Maynard landed at Roosevelt Field he was hailed as the premier flier of the Army Air Service because he had shown superiority in this contest as well as in the New York-Toronto race, in which he was also the victor.

A message from Major Gen. William T. Menoher of the Army Air Service praised him for his courage and skill. The announcement was made that he would start soon on another transcontinental flight over a southerly course. In this flight he will use the De Haviland-4 plane, equipped with a Liberty motor, but stayed with streamline wires—an experiment which he was forbidden to try in the race just finished.

In recognition of his exploit Maynard has been recommended by Brig. Gen. William Mitchell of the Air Service for rating as a military aviator. This rating carries with it an increase in pay amounting to 75 per cent above his salary now as a first lieutenant in the Air Service. Maynard smiled when he heard this recommendation, and intimated that it was his intention to resign from the army within a year. He said it was probable that he would return to the ministry.

Credit in the victory was given by Lieutenant Maynard to his mechanician, Sergeant C. E. Kline, whose quick repairs at Wahoo and Cheyenne enabled the pilot to retain his lead in the race. Kline, who was described by Maynard as "the best mechanic in the Air Service," refused to accept the major share of the credit for the victory, and declared that only the flying of Maynard was responsible for winning the race. He described the "flying pastor" as the "army's best pilot," and declared that he would never work as mechanic for any one else so long as Maynard remained in the service.

In the last 500 miles of the race Maynard raced his motor with such speed that he covered the distance in about four hours, or at an average

speed of about 125 miles an hour, while the average rate of speed in the second lap of the flight was about 110 miles an hour.

Thrilling stories of incidents on the flights were told by Maynard and his mechanic. One was that he sighted a snow-covered peak while he was flying through a storm only in time to miss its crags by about 200 feet. He fought blizzards through the greater part of his flight over Wyoming, and said that in one of these storms he managed to pilot his plane through a lane of clear sky, with heavy winds and storms raging on both sides of his plane.—*Mid-Week Pictorial*, 10/30.

NAVY TO BUY WORLD'S BIGGEST AIRSHIP.—Negotiations are in progress and an early closing of the contract is expected for the purchase by the navy department of the British Rigid Airship *R-38*, the largest airship in the world, now under construction in England. Realizing the necessity of a fleet of airships and knowing that we are far behind Great Britain and Germany in lighter-than-air craft, Congress appropriated sufficient funds to start the construction of one rigid in this country and to purchase a rigid from Great Britain. Two and a half million dollars were appropriated for the purchase of this airship and for the training of the pilots. Through the hearty cooperation of the British Air Ministry with the Navy Department, the final arrangements for this purchase are about to be settled.

The success of the British in building and operating rigid airships is proved by the trip of the *R-34* to the United States and its return to England. While the Germans had many years start on the British, the latter have made a wonderful progress in the past few years. The *R-38* to outward appearances will look like the *R-34*, but her dimensions, horsepower. speed and radius of action will be very much greater.

The new airship when full of gas will have a 2,724,000 cubic feet capacity, which by way of comparison is 15 times of that of the *C-5*, the U. S. Naval dirigible that blew to sea and was lost last spring at Newfoundland just after a record flight up from Cape May and on the eve of an attempt to cross the Atlantic.

The *R-38* is 694 feet in length, 86 feet in diameter, 93 feet 6 inches high and carries a useful load of 45 tons. By comparison the *C-5* is 195 feet in length and 54 feet high. It is expected that the *R-38* will have a maximum speed of 60 knots.

The Air Ministry has offered to train personnel for the *R-38*, so that upon delivery this airship can be taken over immediately by an American crew and be flown to the United States. Officers and men in the navy who have training in airships will probably be sent at the beginning of the year to British Rigid Airship Stations.—*United States Bulletin*, 11/3.

MISCELLANEOUS

SEA POWER AND COMMERCE.—Maritime commerce is dominated by those nations which are the most powerful at sea. The profound influence of sea commerce upon the wealth of nations has always been recognized by historians, the rise and fall being due, in many important instances, to changes in their sea powers. So many destinies have been modified by sea battles that historians often state that the sea is the place where all national destiny is eventually decided. Carthage, the great commercial nation of ancient times, was destroyed by the Roman Navy. The Carthaginians and their relatives the Phœnicians were great maritime peoples. They possessed well-equipped navies, but the Roman Navy was superior in sea power.

Navies played an important part in the recent world war and as a result of it, the German Merchant Marine and Navy have been destroyed. The question now arises with respect to the effects these severe losses will exert on the future of the German nation. Will it recover from them? The Kaiser in 1914, just prior to the war, asserted that Germany's future

was upon the sea. The Germans had built up a great over-sea trade within a few years and possessed the second navy in point of power. They knew the value of sea-power through studying Captain Mahan's books.

Speaking of Germany's future after the war, Herr Ballin said in 1918 that immediately the war ended German ships laden with merchandise should be sent over all the seas, for the nation which restores her over-sea commerce first will become the wealthiest and most powerful. As a result of the pleas made in a speech in which this statement was made, there was a great amount of speculation in German shipping shares, industrial magnates like Stinnes, the Krupps, and others purchased controlling interests in ships, many new shipping companies were formed, shipyards were constructed and elaborate exporting operations were planned. The real conditions of peace have, however, nipped these schemes in the bud and to-day German sea-power belongs to past history.

"The world war has not yet been won," says the Italian historian Ferrero, "because there is political unrest everywhere. It will be definitely won by that people or those peoples who succeed in saving from universal anarchy an authoritative government." These are perhaps extreme statements made by an authority suffering from the temporary effects of adverse local political conditions.

The German admiral Von Tirpitz, perhaps, takes a more correct view when he states that Germany was destroyed by the war and adds: "It only remains for loyal Germans to concentrate themselves on the single aim of checking local political madness, holding up further ruin, and saving as much as possible of those which are our noblest possessions." Von Tirpitz further says that recent events have proved the Germans to have no capacity for the sea. They are unlikely therefore to revive their navy.

These recent judgments of the generally accepted greatest naval authority in Germany are opposed to the opinions largely held by foreign peoples. They are, however, well supported by facts and are probably sound. Should this be so, we may expect Germany, after many social disturbances, to settle down to a simple national life like that of Switzerland, while a new and more vigorous maritime star arises upon the sea. Will these United States of ours be that star?—*Shipping*, 10/29.

NEW GERMAN MERCHANT MARINE.—The German Government is planning the formation of a new German merchant marine. In order to give the German steamship lines, such as the Hamburg-American and North German Lloyd companies, the greater part of whose fleets was given up or seized during and after the war, a new start, the government has decided to begin the distribution of an indemnification grant estimated at more than 250,000,000 marks ($62,500,000). This will include indemnification for the ships and property of German steamship lines seized in New York and elsewhere.

Though this foreshadows the re-birth of the German merchant navy, its development will be slow, restricted by high wages and lack of raw materials, as well as shortage of shipyards, for the latter will be occupied with building 200,000 tons of shipping annually for the Allies to replace vessels sunk by the U-boats in the war.

From talks with leading men connected with the principal German shipping lines, it is inferred that their hopes lie less in the expectation to be able to rebuild the German mercantile marine within the next few years than in some working arrangement with American shipping companies whereby Germany would furnish some ships and also officers and crews, while the lines would be operated and controlled by Americans.—*Shipping*, 10/7.

NEW LIFE SAVING GUN.—In a series of tests made recently for the United States Steamboat Inspection Board, the new G-O Life Line Gun for throwing life lines met every one of the requirements established by the Board

and greatly exceeded the great majority of them. The G-O Life Gun requires no separate powder charge, wad or primer. The charge and projectile are one piece, thus eliminating the danger of moisture getting to the powder.

In one of the tests recently made, the cartridge case was immersed in water and then put into the gun and fired. In another, the barrel of the gun was filled with water, the cartridge inserted and successfully fired through the water, proving that any amount of moisture could not damage the cartridge or mechanism in any way. In none of the tests to which the gun was put was there a misfire or short shot. In every case the projectile went well beyond the mark without the breaking of a single line. The recoil was found to be perceptibly less than any other gun of like character, the teeth on the bottom of the carriage holding the gun firmly in place during all of the tests.—*Shipping*, 10/22.

THE FUTURE OF ST. THOMAS, U. S. A.—Shipping and commerce are the two factors that are going to decide the future of St. Thomas, Virgin Islands, formerly a Danish possession but now a part of the United States.

With shipping in connection with St. Thomas is generally understood ships calling for bunker coal, as the handling of coal has for many years been the main source of livelihood for the laboring class of St. Thomas, and it is the popular belief that St. Thomas is only of importance as a coaling station.

Of course, St. Thomas has had in times past and will have in the time to come great importance as a bunkering station, as well for coal as for oil burning vessels, but St. Thomas is without doubt destined to be much more than a bunkering station in the near future. By virtue of its excellent harbor and its marvelous site, it will undoubtedly some day be one of the shipping and commercial centers of the world.

St. Thomas is right in the track of the traffic between Europe and the Panama Canal and between the East Coast ports of the United States and South America, and it could easily be made advantageous for all the big liners which in the future are going to keep up these routes to make St. Thomas a regular port of call.

Owing to the great increase in the cost of ships and their running expenses, the future world shipping, in order to save time and money, must be based upon large ocean liners touching at certain easy accessible points for transhipment of cargo and passengers by smaller and cheaper vessels especially adapted for the service between these shipping centers and all the different small towns and harbors situated in the trade districts tributary to the various centers.

The hand of nature has endowed St. Thomas with all the qualifications required for being such a world center for shipping and commerce, and it may be hoped that the government and business men of the great country on whom the responsibility rests for the proper development of the unbounded possibilities of St. Thomas harbor, now will give their support and invest some of their money in order to improve the present facilities of the harbor, and restore and further extend the different inter-colonial routes for which St. Thomas was the center before the war.

St. Thomas should, by suitable passenger and cargo, steam or motor ships, be connected with every point of importance on the islands and South American republics bordering the Caribbean Sea; these ships should keep up regular and frequent routes, so that travelers could always be sure of finding shipping opportunities to their destination from St. Thomas, and so that merchants and shippers from all over the world could forward their goods on through bill of lading via St. Thomas to any point on the islands and shores bordering the Caribbean Sea, and vice versa.

The making of St. Thomas into an important point of transhipment would naturally bring about a considerable increase, not only in the

bunkering business, but also in the general demand of provisions and all sorts of merchandise whereby the local trade would greatly benefit.

But in order to assist this island in becoming such a great world center for international shipping and trade, St. Thomas should be made a free port. Being a free port, it would be possible for foreign merchants to store their transhipment goods here any length of time, without paying duty on it, and different raw material could be brought here for manufacturing purposes and exported as finished articles without any interference of customs authorities.

American manufacturers and merchants could make St. Thomas an emporium for American-made goods in the West Indies, when once the steamer connections as outlined above are established, as it is a well-known fact that in order to meet competition in foreign markets successfully, there must be ample supplies readily available at all times and the necessary facilities for shipping the goods in shortest possible time to any point required.

Such conditions would open up undreamed of perspectives for the inhabitants of St. Thomas. What a blessing for this island if we, instead of seeing mothers and young girls running with coal baskets on their heads, could see them taking care of nice clean homes and well-fed children kept up by sober, intelligent and industrious husbands and fathers, who by the proper developments of this beautiful little island, would be in a position to find steady and well-paid work.—*Shipping*, 10/7.

OUR WAR CASUALTIES 322,182 MEN.—The latest official figures, giving our war losses in dead and wounded, show that we lost 116,492 dead and 205,690 wounded, a total of 322,182. This includes army and marine losses on all fronts during the war and from the armistice to September 1, 1919. Of this total 35,585 were killed in action, and 14,472 died of wounds, making a total of 50,057. Disease accounted for 58,073, and 8092 died of accidents and other causes. There are no "missing," all of those so reported having been accounted for.—*Scientific American*, 10/11.

ARMY ITEMS.—The estimated strength of the army September 30 was 346,094, not including 223 Marines in the A. E. F. Of this number 29,163 were in Europe, 2373 enroute from Europe and 280,993 in the United States. The net decrease in army strength since November 11 is 91 per cent.

During the first 29 days of September 24,936 army personnel sailed from Europe, bringing the total embarked since the signing of the armistice to 1,933,901.

During the week ended September 27, 30,141 enlisted men were reported discharged. From November 11 to October 1 the total number discharged was 3,381,765. Of these 169,609 were officers and 3,212,156 enlisted men, the latter including 16,723 furloughed to the reserve. During the month of September a total of 8726 officers were reported discharged.—*Liason*, 10/25.

TANKS.—When we look back on the various mechanical developments during the war one is almost inclined to be afraid that mechanical contrivancies for making war are liable to be overdone.

Yet if one thinks carefully and tries to eliminate some of the inventions it is impossible to suggest the abolition of any particular one. In fact the more one thinks over it the more one realizes that the development of mechanical contrivances is in its infancy and that its possibilities are at present indeterminable.

Take for example tanks. We produced an old "bus" which was capable of crushing wire and putting machine guns out of action and the effect was tremendous. Used mostly in trench attacks, it was also successful in more open warfare at the latter end of the war.

It is not too much to assert that after the initial assault at zero hour, no machine gun battalion ever assisted the infantry forward with their fire to anything like the same extent that fewer guns in a tank did.

Petrol and steel against muscle and bone is a formidable opponent.

The development of these vehicles has only just begun and woe betide the nation which neglects their development.

That they will require an antidote is obvious. At present the only one which causes serious inconvenience is artillery. But remember that future tanks may be able to travel at 20 miles per hour and in very large numbers accompanied by artillery either on tanks or drawn by tractors and the whole problem assumes rather a different aspect.

Infantry and machine guns are powerless against them. The present day horse teams for guns will be as vulnerable as the cavalry and incapable of movement in the presence of tanks.—*The Journal of the Royal Artillery*, September, 1919.

THE GERMAN ARMY.—If the diplomatists, amateur and otherwise, who negotiated the Peace Treaty are persuaded that German militarism has been scotched, they must have abnormal powers of self-deception. At the present moment, when Britain is withdrawing her forces from Archangel, Germany is using her army to substitute herself for the Allies as the savior of Russia. It may or may not be true that she has strong forces with Koltchak, but it is likely, while there is no doubt, whatever, that she has 800,000 well-equipped men along the Polish frontier. As for the Baltic Army of von der Goltz, it is costing 800,000 marks a day. Who is paying for it? Already the Supreme Council of the Allies have issued four ultimatums in succession demanding the withdrawal of German Forces from the Baltic States, only to be contemptuously, if not violently ignored. The truth is that the conditions laid down by the Allies failed to provide for this contingency. Until three months after the ratification of the Peace Treaty no obligation is imposed on Germany to reduce her military forces. She can maintain as many as she pleases and, naturally enough, is making the most of her time. What else could be expected of her? It would be better to recognize that, as we have given her the loophole for agression, it is merely humiliating to send ultimatums which are flouted and to put British officers in the position of being insulted as General Gough was recently by General von der Goltz. But one wonders if German militarism has been so thoroughly crushed as optimistic folk would like to think.—*The Army and Navy Gazette*, 9/27.

ITALIAN BATTLESHIP RAISED.—The Italian Government on September 17 announced a great hydrostatic feat in the raising of Italy's great super-dreadnought, the Leonardo da Vinci, which had been deliberately sunk by the commander in order to save a neighboring town and Italian and Allied warships nearby from the effects of a terrible explosion caused by a clockwork bomb placed on the vessel by some unknown hand. The vessel overturned as it sank, and the heavy guns became imbedded in the sand at the bottom of the sea. It took months of patient, strenuous work to remove the cannon and other equipment, and to bring the gigantic hull to the surface by pumping compressed air into it. At the date mentioned the vessel was ready to be towed into dock and restored to its former value and efficiency.—*The New York Times Current History*, October, 1919.

THE ISLAND OF YAP.—The little Island of Yap in the Pacific Ocean suddenly loomed up as an international question when it developed in a conference between President Wilson and the Senate Foreign Committee that this island was an important cable center and that the United States naval authorities were anxious to have it annexed by the United States.

Yap is the center of a cable system formerly owned by a German cable company. These cables if taken over by the United States would be made to form an integral part of the American cable system already in the Pacific and thus strengthen American trade and commerce, not to speak of the importance of the island and its cable connections from a strategic standpoint.

Up to the time of the outbreak of the war in 1914, the island was owned by the German Government and was the center of a cable system which that government was developing in the Pacific. In 1914 it was seized by the Japanese Government and is being held by that government pending its final disposition by the Allies, but it is understood that Japan is anxious to hold it permanently, together with its cable connections.—*The New York Times Current History,* October, 1919.

GERMANY'S "GAME" IN THE BALTIC REGION.—"Germany lost her colonies, but won Russia," is the pregnant remark attributed to a German officer serving in the Russian Guard Regiment by General Vassilkovsky, a Russian military leader of repute who was at one time commander of the Petrograd forces, and who barely managed to escape death at the hands of the Bolsheviks. He cites this new interpretation of victory in a message to the British people, and sheds great light to some on the significance of the German effort to retain the Baltic region. The Allied authorities are not thoroughly reassured even now that General von der Goltz, as reported, has really transferred his command in the Baltic region to General von Eberhardt, and that German troops are being withdrawn. A semi-official statement reported a complete stoppage of provisions to the insubordinate troops in the Baltic lands except those who were demonstrably returning, and said that all passenger traffic was stopped except empty trains sent to fetch the troops.

More information about the German military movement in the Baltic provinces appears in a letter in the Berlin *Vorwarts,* written by a Social Democrat on his return from that section. He relates that even the smallest places were being occupied by troops and that he saw posters in the office of a military captain which read: "The fight is for the Kaiser and the Empire against Democracy. We will rather die than be dishonored." The orderly of the captain in whose office this poster appeared, according to the *Vorwarts* correspondent, had no doubt but that they would soon put down Noske with his own soldiers. This was easy, "as they had enough friends among Noske's troops, and the democratic government, with all its Jews, would be expelled and the necessary pogroms seen to. The Kaiser's Empire would then be reerected, and the Social Democrats would see how Germans establish order." According to rushed into Lettonia and Courland have been promised recognition as and the *Vorwarts* asks: "Who is paying for these counter-revolutionary bands?" The Paris *Victoire* charges that for months the Germany of Scheidemann, Ebert, and Noske, Socialist Germany, intrigued with the same persistent astuteness as the Germany of Bethmann-Holweg and the Kaiser, and it adds:

"Forced to withdraw its troops from Esthonia and then from a part of Lettonia, or Latvia, the German Government decided to keep them in Courland, where the Allies had the strange notion to seek their kind offices in opposing Bolshevism. In Lettonia, Germany was strong enough to overthrow the autonomous government established by the Letts, and though with the aid of the Allies this government succeeded in reestablishing itself three months later, Germany nevertheless kept right on plotting. Her army, cammanded by von der Goltz, lost no men through demobilization, as did our armies of the east, but was strengthened by volunteers openly enlisted in Berlin. These German volunteers who rushed into Lettonia and Courland have been promised recognition as

citizens of the Lettish Republic and a grant of land in Lettish territory. Thus Germany renounces annexation of the Baltic provinces but reinforces her policy of Germanic colonization, How wonderful, and we never even guessed it! Yet one may imagine how the German troops will conduct themselves towards the Lettish people whom the German barons represent to be an inferior nation. There will be requisitions, thefts and pillage, for the Germans deny themselves nothing, and it may be that after the departure of the Germans an acounting will be demanded from the German barons for the exactions of their soldiers."—*The Literary Digest*, 10/25.

INTERNAL COMBUSTION ENGINED WARSHIPS.—Lord Fisher's recent communications to the *Times*, urging economy and suggesting characteristically sweeping means to that end, have raised afresh some controversial points. The nation is not unmindful of the contribution in the past of Lord Fisher in adopting strong measures to ensure at all costs that the efficiency of the fleet should be maintained at the highest possible value. A reminder is hardly needed of the part played in securing such efficiency of fighting force by the water-tube boiler, the steam turbine, the big gun, and the submarine, or of our indebtedness to Lord Fisher in his advocacy of these important factors. As a result, such improvements were effected in naval engineering that when the war commenced we led the world by a good margin. Lord Fisher also realized at an early date the potentialities of the internal combustion engine as a means of propulsion for fighting ships.

This subject was first raised in a paper before the Institution of Naval Architects given by Sir James McKechnie on March 20, 1907. Later on, it will be remembered, a Royal Commission was set up at the instigation of Lord Fisher, and presided over by him. The findings of this commission have not been made public, but it was generally recognized that the report was a disappointment to Lord Fisher to the extent that it indicated that at the time when the inquiry was held a great amount of development still remained to take place before the internal combustion engine could be regarded as assailing the first place in naval propulsion firmly and justly occupied by the steam turbine. The commission certainly served a useful purpose by the collection of evidence and data which showed clearly the state of the internal combustion engine at that time and indicated the work to be undertaken and the problems to be solved before a reconsideration of the application of the Diesel engine to naval work of high power need arise. Oil having been proved in practice in the interval to be the fuel *par excellence* for naval use, and the Diesel being that type of internal combustion engine best suited to utilize that fuel with maximum economy at relatively high powers (for this class of prime mover) our present remarks may be confined solely thereto.

Lord Fisher's recent letters to the press have given rise in the minds of many engineers to that reconsideration. During the war experiments on such subjects would not have been justified, and reliance was placed rather on combinations of well-tried units, changes being made only after full consideration of the maximum possible detrimental effect on fighting efficiency should the anticipated improvement be completely negatived. Such, however, was the mass of the production of naval machinery undertaken during the war that short steps carried us relatively long distances, and in effect the progress made during this period in most of the branches of naval engineering was greater than in any previous period of time of equal length. The one exception is undoubtedly the Diesel engine. The same 100 brake horsepower per cylinder that was standard in our submarines before the war was the standard, except for minor improvements, at the end. The Germans in their submarines had engines of some 300 brake horsepower per cylinder (see *Engineering*, "German Submarine Diesel Engines," June 13 last, page 763), and the Clyde during the war produced a merchantman with two main engines of 16 Diesel cylinders, developing in normal running at sea a total of 6600 indicated horsepower, or over

330 brake horsepower per cylinder. The engines referred to are the four-cycle single-acting Diesel engines of the motor ship *Glenapp*. The cylinders have a diameter of 760 mm. (29.92 in.) with a stroke of 1100 mm. (43.31 in.) and run at 125 revolutions per minute These are not experimental engines, although much work of such a nature has been undertaken and remains to be recorded. Before the war many rumors concerning Diesel engines building on the Continent for battleships were current. The facts are briefly as follow: The M. A. N. Company, at Nuremberg, built a three-cylinder two-cycle double-acting engine, from which several thousands of horsepower were expected. The results, however, were disappointing, and a serious accident—an explosion in the scavenging system setting fire to the staging and screens erected round the engine for secrecy—which, however, concerned only very indirectly the main principles of the Diesel engine, had the direct effect on the continent of stopping the great amount of experimental work of very similar nature in process at that time. Messrs. Krupp in Germany built a 2000 brake horsepower double-acting two-cycle cylinder, with which no substantial success was achieved. In France Messrs. Schneider, of Le Creusot, under license from Messrs. Carels, of Ghent, constructed a 1000 brake horsepower single-acting two-cycle engine, regarding which no detailed results are available.

Perhaps the most successful of such units was that of Messrs. Sulzer, of Winterthur, where a single-acting two-cycle cylinder of 39.4 in. diameter by 43.3 in. stroke developed at 150 revolutions per minute, it is claimed, 2000 brake horsepower, with a fair measure of success, sufficient, at any rate, to justify the builders in standardizing a two-cycle cylinder of 600 brake horsepower with a cylinder diameter of 29.5 in. and a stroke of 39.4 in., running at 130 revolutions per minute. A six-cylinder engine of these units gives 3600 brake horsepower, and of these several have been built for land work.

These pre-war examples indicate the progress made up to that date, and it must be admitted that the large experimental engines were generally unsuccessful, even although they were designed and built with the one and only aim of giving the maximum horsepower regardless of any other considerations such as weight, compactness, piston speed or speed of revolution. The explanation is to be found in that they were too far ahead of the knowledge at that time of this type of engine. In some cases the experiment may have been justified on the score that the information gained was applicable to and effected improvement with engines of moderate power. The *raison d'être* of this pre-war campaign was that Germany, in many ways the home of the Diesel engine, had lagged behind with the steam turbine, but hoped by intensive development, government fostered, to regain, with this prime mover, the place she had lost on account of our progress meantime with the steam turbine. In this Germany failed, although her engine builders can claim that their largest war submarine engines showed latterly a power capacity per cylinder of nearly three times that achieved by the British standard engine.

Another landmark is the 400-500 brake horsepower submarine unit cylinder of 350 revolutions per minute, designed and built by Messrs. Sulzer during the war, with which highly satisfactory results have, it is believed, been obtained. Six-cylinder engines composed of these units have been built developing 3000 brake horsepower per engine.

These examples indicate in a general way the various steps in the development of the Diesel engine up to the present time. The question then is, can we assess a value to this progress in comparison with the total distance required to be traveled before such prime movers can be considered for first-line fighting units of the fleet? In view of the success of the steam turbine such a consideration will be regarded by some as unnecessary.

The Diesel engine possesses potentialities for fighting ships that demand repeated attention in order that they may be equated to naval requirements if and when the known deficiencies are remedied. The attractions of the

Diesel engine are: Its oil economy, using the most suitable naval fuel, far surpassing the best results achieved by or predicted for the steam turbine; its readiness for immediate service without requiring warming through, etc., the relative ease with which exhaust gases can be discharged compared with these for steam plant, the better arrangements of guns and machinery due to the elimination of the uptakes and the substitution of a relatively small exhaust pipe for funnels. Against these advantages must be set the disadvantages of small power per unit cylinder, the high weight, height and uncertainty of operation, especially with large units, under certain practical conditions.

Instancing three standard powers of naval vessels, the small battle cruiser and the battleship, and light cruiser and torpedo-boat destroyer, the first of 80,000 shaft horsepower, and the others of from 40,000 to 27,000 shaft horsepower, and assuming cylinders of 1000 brake horsepower, 80, 40 and 27 would be required. The maximum number of Diesel cylinders in any vessel afloat is found in the *J* class submarine boats, with their 36 cylinders (three 12-cylinder engines). The maximum number of units which can be regarded as suitable is therefore relatively large. Twelve turbines and more than twelve boilers are not regarded as excessive in steam practice, and 36 cylinders in the case of internal combustion engines have, as already mentioned, proved a sound arrangement.

In respect of increase of power per unit with Diesel engines, progress, it will be seen, has been relatively slow. Up to 300-400 brake horsepower can be said to be proved at the present time to be practical politics. Higher powers still can no doubt be made to give quite satisfactory service, but the demand hitherto has been severely limited by the remarkably rapid success of the application of geared turbine machinery for vessels of all powers, down even to relatively small installations. For naval work, however, the advantages of internal combustion create an insistent demand.

Success in the past with increasing power of Diesel engines has not been achieved without encountering many difficulties. Chiefly, it must be stated, on account of insufficient attention being paid to small and intricate but absolutely essential details, of which with this type of engine there are so many. Knowledge is increasing, and a satisfactory cylinder developing 1000 brake horsepower may confidently be anticipated in the near future. Whether, however, it will meet naval requirements or not is another matter, depending essentially on considerations of weight, space occupied, and such factors. We discussed the future of this type of prime mover in regard to these terms in an article entitled "Internal Combustion Engines for Submarines and Aircraft," published in *Engineering* of September 20, 1918, page 319, and held that the future would see in such work much progress, as has been the case with other prime movers, notably the petrol aero engine. The internal combustion turbine also has been discussed, but still remains no more than a fervent hope.

It is too early yet to speak in any definite way of future naval policy, yet, in all probability, the efforts of the next few years, at any rate, will be concentrated upon the development of those types of fighting units that have proved themselves or have indicated the path of progress. This policy will entail considerable experiment, in which the Diesel engine will not be overlooked. Such work is always costly, and whether or not the results are dearly bought depends largely upon the method of control, the imagination brought to bear, and the careful consolidation of each step gained.—*Engineering*, 9/19.

CURRENT NAVAL AND PROFESSIONAL PAPERS

The Future of the American Merchant Marine. By J. H. Mull (President of Cramp's). *Nautical Gazette*, October 4.

Our Senior Armed Sea Service (Coast Guard). By Robert G. Skerrett. To Revise the Navigation Laws. What is the Government Doing to Shipping. By Henry C. Wiltbank. *The Rudder*, November.

Atmospheric Electricity. By W. F. G. Swann. Optics of the Air. By W. J. Humphreys. The Hiding Power of White Pigments and Paint. By A. H. Pfund. *Journal of the Franklin Institute*, November.

The Internal Combustion Turbine. *Engineering*, September 5. British Tanks in the War. *Engineering*, September 12. The Construction of the U. S. Destroyer *Ward* (illustrated). *Engineering*, October 24.

Economy on the Fleet: Lord Fisher's Demand. By Archibald Hurd. The Empire and Asiatic Immigration. By Vance Palmer. *Fortnightly Review*, October.

The Development of Airplane Motherships. *Schiffbau*, October 22.

ANNOUNCEMENT

Chas. Cory & Son, Inc., main office and factory at 290 Hudson Street, New York, N. Y., have announced the opening of a new branch at 83 Columbia Street, Seattle, Wash., in order that their ships' electrical installation and repair and mechanical communicating work in this district may be more expeditiously handled. The Cory Company announces that it will carry a complete stock of marine electrical appliances and mechanical communication apparatus at their Seattle branch, which will be available for immediate deliveries.

DIPLOMATIC NOTES

FROM OCTOBER 15 TO NOVEMBER 15

PREPARED BY

ALLAN WESTCOTT, Associate Professor, U. S. Naval Academy

PEACE TREATY DEBATE IN THE SENATE

THE FIGHT FOR RESERVATIONS.—The United States Senate during October defeated all proposed amendments to the Peace Treaty and the League of Nations Covenant, and proceeded to consideration of the sharply phrased preamble and reservations of the Ratification Resolution as proposed by the majority of the Committee on Foreign Relations. On November 7 the Senate adopted the preamble of the resolution by a vote of 48 to 40, after defeating several attempts to either modify or stiffen its terms. The "Mild Reservationists" voted for the preamble, which was also supported by Senators Gore, Walsh (Mass.), and Reed from the Democratic side.

On November 14 the Senate by a vote of 46 to 33 adopted the second reservation (see following) which modified Article X of the League Covenant, and which was denounced by the President as a knife thrust at the heart of the Treaty. This reservation in effect stated our refusal to assume international obligations and declared that no armed assistance would be given without an act of Congress. On November 19 the Ratification Resolution was defeated by a vote of 41 to 50, and the Senate adjourned.

Text of Ratification Resolution.—The preamble and reservations proposed by the committee read:

Preamble.—The reservations and understandings adopted by the Senate are to be made a part and a condition of the resolution of ratification, which ratification is not to take effect or bind the United States until the said following reservations and understandings adopted by the Senate have been accepted by an exchange of notes as a part and a condition of said instrument of ratification by at least three of the four principal Allied and Associated Powers, to wit, Great Britain, France, Italy, and Japan:

RESERVATION NO. 1

The United States understands and construes Article I that in case of withdrawal from the League of Nations, as provided in said article, the United States shall be the sole judge as to whether all its international obligations and all its obligations under the said covenant have been fulfilled, and notice of withdrawal by the United States may be given by a concurrent resolution of the Congress of the United States.

RESERVATION NO. 2

The United States assumes no obligation to preserve the territorial integrity or political independence of any other country or to interfere in controversies between nations—whether members of the League or not—

under the provisions of Article X, or to employ the military or naval forces of the United States under any article of the Treaty for any purpose, unless in any particular case the Congress, which, under the Constitution, has the sole power to declare war or to authorize the employment of the military or naval forces of the United States, shall by an act or joint resolution, so provide.

RESERVATION NO. 3

No mandate shall be accepted by the United States under Article XXII, part 1, or any other provision of the Treaty of Peace with Germany, except by action of the Congress of the United States.

RESERVATION NO. 4

The United States reserves to itself exclusively the right to decide what questions are within its domestic jurisdiction and declare that all domestic and political questions relating wholly or in part to its internal affairs, including immigration, labor, coastwise traffic, the tariff, commerce, and all other domestic questions, are solely within the jurisdiction of the United States and are not under this treaty to be submitted in any way either to arbitration or to the consideration of the Council or Assembly of the League of Nations or any agency thereof, or to the decision or recommendation of any other power.

RESERVATION NO. 5

The United States will not submit to arbitration by the Assembly or the Council of the League of Nations (provided for in said Treaty of Peace) any questions which in the judgment of the United States depend on or relate to its long-established policy, commonly known as the Monroe Doctrine; said doctrine is to be interpreted by the United States alone and is hereby declared to be wholly outside the jurisdiction of said League of Nations and entirely unaffected by any provision contained in the said treaty of peace with Germany.

RESERVATION NO. 6

The United States withholds its assent to Articles 156, 157, and 158, and reserves full liberty of action with respect to any controversy which may arise under said articles between the Republic of China and the Empire of Japan.

RESERVATION NO. 7

The Congress of the United States by law will provide for the appointment of the representatives of the United States in the Assembly and the Council of the League of Nations, and may in its discretion provide for the participation of the United States in any commission, committee, tribunal, court, council, or conference, or in the selection of any members thereof and for the appointment of members of said commission, committee, court, council, or conference, or any other representatives under the Treaty of Peace, or in carrying out its provisions and until such participation and appointment have been so provided for and the powers and duties of such representative so defined, no person shall represent the United States under either such said League of Nations or the Treaty, or be authorized to perform any act for or on behalf of the United States thereunder, and no citizen of the United States shall be selected or appointed as a member of said commissions, committees, courts, councils, or conferences except with the approval of the Congress of the United States.

RESERVATION NO. 8

The United States understands that the Reparations Commission will regulate or interfere with exports from the United States to Germany, or

from Germany to the United States, only when the United States by its Congress approves such regulation or interference.

RESERVATION NO. 9

The United States shall not be obligated to contribute to any expenses of the League of Nations or secretariat or any commission, committee, or conference or other agency, organized under the League of Nations, or under the Treaty, or for the purpose of carrying out the treaty provisions, unless and until an appropriation of funds available for such expenses shall have been made by the Congress of the United States.

RESERVATION NO. 10

If the United States shall at any time adopt any plan for the limitation of armaments proposed by the Council of the League of Nations under the provisions of Article VIII, it reserves the right to increase such armament without the consent of the Council whenever the United States is threatened with invasion or engaged in war.

RESERVATION NO. 11

The United States construes sub-division "C" of Article XXIII to mean that the League shall refuse to recognize agreements with regard to the traffic in women and children and that the League shall use every means possible to abolish and do away with such practice.

RESERVATION NO. 12

The United States reserves the right to permit, in its discretion, the nationals of a covenant-breaking state, as defined in Article XVI of the covenant of the League of Nations, to continue their commercial, financial and personal relations with the nationals of the United States.

RESERVATION NO. 13

Nothing in Articles 296, 297, or in any of the annexes thereto, or in any other article, provision, section or annex of the Treaty of Peace with Germany shall, as against citizens of the United States, be taken to mean any confirmation, ratification or approval of any act otherwise illegal or in contravention of the rights of citizens of the United States.

(This pertains to the provisions of the sections dealing with alien property.)

GERMANY

GERMANY MUST FULFILL OBLIGATIONS.—Washington, Nov. 6.—The Peace Conference has notified the German Government that the peace treaty will not be put into force until Germany fulfills certain obligations under the armistice which have not yet been carried out.

Unless Germany vests its representatives—sent to Paris for the purpose of signing the procès-verbal, which would put the treaty in force—with full powers to sign at the same time a protocol pledging Germany to carry out certain stipulated conditions, the treaty will not take effect. The allied and associated powers will then have recourse to "any coercive measures" which they may deem appropriate.

Among the considerations set forth in the proposed protocol are requirements that Germany deliver certain vessels in return for the destruction of the German fleet at Scapa Flow within a period of sixty days; that, within ninety days, Germany deliver 400,000 tons of floating docks, cranes, tugs and dredges; that the destroyer *B-98* be surrendered to the Allies; that, within ten days, the machinery and engines of three submarines be also

surrendered to offset the destruction of submarine *C-48*, and that Germany pay the Allied governments the value of certain exported aerial material.

According to the treaty, its terms would come into force from the date of a first procès-verbal to be deposited at Paris. This procès-verbal can be drawn up only after Germany and three of the principal allied and associated powers have deposited at Paris their ratifications of the treaty.

The note to the German Government, which was sent last Saturday night, and is signed by M. Clemenceau as President of the Peace Conference, explains that three allied powers—Great Britain, France and Italy—have now ratified the treaty, and that Germany, having ratified, the conditions have been fulfilled for drafting the first procès-verbal, but unless Germany fulfills certain violated armistice conditions the treaty will not be put into effect.—*N. Y. Times*, 7/11.

DEMAND FOR GERMAN OFFENDERS.—Paris, Nov. 7.—The Supreme Council to-day appointed a commission to make a final draft of the list of Germans charged with war crimes which the Berlin Government will be called on to hand over for prosecution. This commission will also determine the composition and procedure of the tribunal which will conduct the trials of these men.

Two weeks ago the French list of accused Germans, numbering 600, was submitted to the Peace Conference. This list has been somewhat changed, Premier Clemenceau himself having made some alterations. The lists from England and Belgium are now ready, and all these will be incorporated in one big list, carrying after each name a brief summary of the accusations.

A demand for these persons will be served upon Germany immediately after the Peace Treaty goes into effect.—*N. Y. Times*, 8/11.

PLANS FOR PLEBISCITES.—Paris, Nov. 4.—The chairmanship of the inter-allied commission to supervise the plebiscite in Upper Silesia to determine whether this highly important mining region is to belong to Poland or Germany was assigned to France by the Supreme Council to-day. An American representative may head the commission to supervise the plebiscite in Teschen, demanded by Poland and Czechoslovakia, but until ratification of the treaty by the United States France will furnish the chairman of this commission also. The chairmanship for the Allenstein district of East Prussia was assigned to England, and that for Marienwerder, East Prussia, to Italy.

November 10 has been fixed by the Supreme Council as the date when the plebiscite commission created under the German peace treaty shall meet in Paris to discuss the elections in the various areas the political affiliation of which is to be settled by popular vote. The United States will not be represented, even unofficially, at this meeting.

HOLLAND AVERSE TO SURRENDER OF EX-KAISER.—According to an Associated Press report of November 8 the Dutch Government would oppose any effort of the Powers to secure the extradition of the former Kaiser, on the ground that he could not legally be regarded as a criminal. Nor would any effort be made to prevent his return to Germany. On November 12 the former Kaiser took possession of the House of Doorn, at Doorn, Holland, which he had purchased some time before and which he plans to occupy early in 1920.

RUSSIA

BALTIC COMMISSION STARTS WORK.—The Baltic Commission created by the Paris Council and headed by General Niessel of the French Army,

left for Berlin on November 5, with instructions merely to effect the evacuation of Courland by the Germans. While France and England were reported not averse to efforts to "stabilize" conditions in the Baltic provinces of Russia, the American delegates insisted that the commission had but one duty—to effect the evacuation of the Germans. The American delegates were reported to oppose any solution of the Baltic question that would necessitate the dismemberment of the territories formerly in the Russian Empire.

GERMANS DRIVEN FROM RIGA.—Press reports of November 12 stated that on November 11 Lettish troops, supported by the Allied fleet, drove back German-Russian forces near Riga and reoccupied the city.

GERMANS REJECT SOVIET BLOCKADE.—A German press statement of the close of October reported the refusal of the German Government to participate in the Allied blockade of Russia, on the ground that Germany could not against any people take part in a measure by which Germany had suffered so severely. Efforts would be made, however, to prevent food and reinforcements from reaching the German troops that had refused to return from West Russia.

CONFERENCE IN RUSSIA.—Premier Lloyd George announced in Parliament on November 13 that he planned in the near future to suggest an international conference at which representatives of the Allied and Associated Powers might again take up the Russian situation.

ITALY

ITALIAN ELECTIONS ON NOVEMBER 16.—In the Italian elections on November 16 the chief parties represented by candidates were the Socialists and the Popular (Catholic) party. These were the only parties that had well defined and widely diffused political programs. The other parties were for the most part merely followers of individuals—Orlando, Giolitti, Salandra, etc. In a political speech on November 8 ex-Premier Orlando asserted that there had been no change in the Adriatic situation, but that Italy had attained her chief objects in the war by extending her boundaries to the Bremner and thus achieving a defensible frontier.

PROPOSED FIUME SETTLEMENT.—From the Italian Embassy in Washington came a statement in early November to the effect that if Signor Tittoni's recent proposals on the Adriatic question were accepted, D'Annunzio would withdraw from Fiume and leave the final settlement of the question to the Italian Government. In brief, the Tittoni proposals would give Italy practically all of Istria, a certain suzerainty over the town of Zara in Dalmatia, and considerable number of the Dalmatian islands, leaving Fiume and its environs as a buffer state under control of the League, and the main land of Dalmatia in the hands of the Jugoslavs.

AUSTRIA

PEACE TREATY RATIFIED.—On October 17 the Austrian National Assembly ratified the Peace Treaty of St. Germain without debate and with opposition only from the German party. The Treaty was signed on October 25 by Karl Seitz, President of the Austrian Republic.

On November 7 the Temporary Reparations Committee for Austria, after sitting at Vienna for 10 days, submitted a report to the Paris Council. Far from being able to assume payment of large idemnities, Austria, it is said, will require support if she is to remain a separate country, including an initial loan of about $100,000,000.

RUMANIA

On November 4 the Supreme Council sent a note to Rumania demanding an immediate answer to its note of October 12 which requested an explanation of Rumania's arbitrary action in invading Hungary and annexing the former Russian territory of Bessarabia. It appears that Rumania's failure to reply was based on the ground that Italy had not joined in the demand of October 12.

In Paris diplomatic circles it was suggested that both France and Italy, though acquiescing in the Allied protests, were in reality not unwiling to secure favor with Rumania by permitting her to make good by force her territorial desires. This attitude was clearly reflected in the French press.

Still another note to Rumania was despatched on November 7, making a peremptory demand that the Rumanian troops in Hungary be immediately withdrawn.

The reply of Rumania to this last note was evasive and unsatisfactory, expressing a willingness to retire only to the River Theiss and not to the lines established by the Armistice.

BULGARIA

BULGARIA ACCEPTS TREATY.—Paris, Nov. 13.—The Peace Conference has received information from Sofia that the Bulgarian Government has decided to accept and sign the Peace Treaty as presented to the Bulgarian delegation.

The Bulgarian Premier, M. Stambulisky, who left Sofia for Paris yesterday, is expected to sign the treaty to-morrow.—*N. Y. Times*, 14/11.

NEAR EAST

BRITISH WITHDRAW FROM SYRIA.—On October 30 the British Government announced an arrangement with France and the King of the Hedjaz in accordance with which British forces would be immediately withdrawn from Syria, and the duties of occupation would be assumed by French and Arabs. No change is indicated in the British policy regarding the final settlement in the Near East, which must follow the signing of the Turkish treaty.

AMERICAN CONTROL IN TURKEY URGED.—Henry Morgenthau, ex-Ambassador to Turkey, upon his return from Poland where he headed the Com-

mission to Investigate the Treatment of Jews, launched an appeal for the acceptance by the United States of a mandate for Constantinople, Armenia, and Anatolia. He declared that he had been assured by "leading statesmen" of England that Great Britain urged our acceptance of the mandate on our own terms, welcoming the United States in the Mediterranean as a full partner and offering even joint control of Gibraltar.

In a speech at Sheffield on October 17, Prime Minister Lloyd George also urged American aid in Turkey.

FAR EAST

JAPANESE TROOPS NOT SUBJECT TO SIBERIAN RAILWAY BOARD.—On November 2 the Japanese Government forwarded a reply to the American note sent in September calling attention to the failure of Japanese troops to co-operate in the work of the Inter-Allied Railway Commission in Siberia under John W. Stevens. The Note drew a distinction between military protection of the railroads, which Japan professed willingness to supply, and obedience to the orders and instructions of the Commission, which was in no wise contemplated.

The government, so reads the note, wishes especially to emphasize the fact that the primary duty of the military is the defence of the railway itself, believing that this is vital if the railway is to be operated at all. It is thought, too, that the government of the United States will recognize the great efforts and sacrifices made by the Japanese troops in defence of the railway.

If, however, it is declared in the note, the American Government thinks that the allied military forces should be made subordinate to the Interallied Commission or to the subsidiary technical board, the Japanese Government regrets to say that it is unable to fall in line with that attitude.

However, the Japanese Government would in no case insist that their military forces are under no obligation to co-operate in forwarding the general operation of the railroad. The Japanese troops will put forward all possible efforts to remove anything that stands in the way of the operation of the railroad and will by no means shut their eyes to the perpetration of offences calculated to endanger the lives and property of inspectors and engineers.

Taking up the American references to the instructions to the Japanese military concerning non-interference in case of disputes, the note submits that there seems to be nothing improper in this stand. On the contrary, it thinks that any uncalled-for intervention by Japanese troops in disputes between officials or military forces of the allied powers would be likely to create a grave situation, pregnant with the most undesirable consequences. The object of the Japanese instructions being to avoid the creation of any cause of misunderstanding or ill-feeling, it seems evident what great importance is attached in the instructions to the furtherance of mutual understanding and co-operation.

"It would, therefore, be wide of the mark," it is stated, "to allege that in regard to the general operation of the railway the Japanese troops accept no obligation for co-operation."—*N. Y. Times*, 8/11.

DECLARES JAPAN WILLING TO EVACUATE SIBERIA.—Omsk, Oct. 16.—Count Tsunetada Kato, the special Japanese Ambassador to the All-Russian Government at Omsk, has arrived in Omsk and in a statement to representatives of the press declared that the Japanese troops in Siberia would be

withdrawn whenever the All-Russian Government so desired. In his statement he said:

"The aim of my presence here is to strengthen the bond between the Russian and Japanese people. I assure you that the help coming from the Japanese is entirely disinterested, for a strong and united Russia is as indispensable to Japan as to Russia itself. Bolshevism is as dangerous for Japan as for Russia, and it is of great importance that we prevent its extension in the East.

"As regards Japanese troops in Siberia, their presence depends entirely on the wishes of the Russian Government and if Russia feels that she no longer has need of our troops, we will at once recall them. The Russian people can rest assured that Japan will never permit herself in any way to offend the dignity of Russia."—*N. Y. Times,* 27/10.

MEXICO

UNITED STATES PROTESTS ARMS IMPORTS.—Washington, Nov. 13 (Associated Press).—Large orders for arms and ammunition placed by Mexico in Belgium and Spain, in preparation for the possibility of American intervention, came to light to-day when the State Department let it become known that the government had taken steps to prevent their shipment.

The Chargé d'Affaires of the embassy in Brussels has protested, under instructions, that shipment of the munitions would be in violation of the International Arms Convention. As Spain is not a party to the agreement, which was designed to aid in keeping the peace of the world during the post-war transition period, no such direct action is probable at Madrid.

The order in Belgium was placed with the Fabrique Nationale d'Arms at Liége, probably under the direction of Candido Aguilar, Mexican Minister of Foreign Affairs and President Carranza's son-in-law, who went to Europe recently after stopping here and placing a wreath on George Washington's tomb at Mount Vernon.—*N. Y. Times,* 14/11.

UNITED STATES

LABOR CONGRESS IN WASHINGTON.—The International Labor Conference called in accordance with the decisions of the Paris Peace Conference, began its first session in Washington in October. The opening weeks of the session were taken up with the task of organization and the admission of members. On October 30 the Conference, with but a single opposing vote from the French capital delegate, decided to admit representatives of Germany and Austria to full membership in the world labor organization.

REVIEW OF BOOKS

ON

SUBJECTS OF PROFESSIONAL INTEREST

"Elements of Radio Telegraphy." By Lieutenant Ellery W. Stone, U. S. N. R. F. (New York: D. Van Nostrand Company.)

The non-technical student of radio seldom finds a text book in which the subject matter is presented in such a manner as to be interesting from the very start. The above book is an exception to the rule. The dry facts concerning physical phenomena are interspersed with other matter throughout the book and so corelated as to be easily remembered.

The technical student will find in this treatise a store-house of information, much of which is seldom found in text books. Points which are of interest to operators and designers, but which are not essential to the understanding of the elementary theory involved are often omitted from a text in order to simplify or shorten the text. Such points are brought out in full in this book.

The author, an inventor and designer himself, has had a very extended experience in radio work and his explanations and deductions may be accepted as conclusive.

As stated by the author the book is a résumé of a series of lectures and the subject matter is not arranged in the conventional manner of text books in general—a decided advantage to any one but the elementary student.

An unusually complete description and explanation of commercial types of apparatus is presented.

The subject of vacuum tubes is not accorded the treatment deemed desirable by its relative importance in modern radio practice, but the book is excellent withal.

P. L. H.

NOTICE

NOTICE TO MEMBERS

More members, both regular and associate, are desired. Any increase in membership invariably means a larger number of articles submitted, and consequently an improvement in the PROCEEDINGS.

You are requested to send or give the attached slip to some one eligible for membership, urging him to join.

By direction of the Board of Control,

S. A. TAFFINDER,
Secretary-Treasurer.

Attention is invited to extracts from the constitution on the opposite page as to the requirements in making applications for life, regular and associate membership.

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.....*191*

To the Secretary and Treasurer,
U. S. Naval Institute,
Annapolis, Md.

Dear Sir:

Please enroll my name as a { *regular* / *associate* } *member of the U. S. Naval Institute from*.....

Very truly yours,

.....

.....

Members and associate members are liable for the payment of the annual dues until the date of the receipt of their resignation in writing. Annual dues $3.00.

NOTICE

The U. S. Naval Institute was established in 1873, having for its object the advancement of professional and scientific knowledge in the Navy. It is now in its forty-seventh year of existence. The members of the Board of Control cordially invite the co-operation and aid of their brother officers and others interested in the Navy, in furtherance of the aims of the Institute, by the contribution of papers upon subjects of interest to the naval profession, as well as by personal support.

On the subject of membership the Constitution reads as follows:

ARTICLE VII

Sec. 1. The Institute shall consist of regular, life, honorary and associate members.

Sec. 2. Officers of the Navy, Marine Corps, and all civil officers attached to the Naval Service, shall be entitled to become regular or life members, without ballot, on payment of dues or fees to the Secretary and Treasurer. Members who resign from the Navy subsequent to joining the Institute will be regarded as belonging to the class described in this Section.

Sec. 3. The Prize Essayist of each year shall be a life member without payment of fee.

Sec. 4. Honorary members shall be selected from distinguished Naval and Military Officers, and from eminent men of learning in civil life. The Secretary of the Navy shall be, *ex officio*, an honorary member. Their number shall not exceed thirty (30). Nominations for honorary member must be favorably reported by the Board of Control. To be declared elected, they must receive the affirmative vote of three-quarters of the members represented at regular or stated meetings, either in person or by proxy.

Sec. 5. Associate members shall be elected from Officers of the Army, Revenue Cutter Service, foreign officers of the Naval and Military professions, and from persons in civil life who may be interested in the purposes of the Institute.

Sec. 6. Those entitled to become associate members may be elected life members, provided that the number not officially connected with the Navy and Marine Corps shall not at any time exceed one hundred (100).

Sec. 7. Associate members and life members, other than those entitled to regular membership, shall be elected as follows: "Nominations shall be made in writing to the Secretary and Treasurer, with the name of the member making them, and such nominations shall be submitted to the Board of Control. The Board of Control will at each regular meeting ballot on the nominations submitted for election, and nominees receiving a majority of the votes of the board membership shall be considered elected to membership in the United States Naval Institute."

Sec. 8. The annual dues for regular and associate members shall be three dollars, all of which shall be for a year's subscription to the UNITED STATES NAVAL INSTITUTE PROCEEDINGS, payable upon joining the Institute, and upon the first day of each succeeding January. The fee for life membership shall be forty dollars, but if any regular or associate member has paid his dues for the year in which he wishes to be transferred to life membership, or has paid his dues for any future year or years, the amount so paid shall be deducted from the fee for life membership.

ARTICLE X

Sec. 2. One copy of the PROCEEDINGS, when published, shall be furnished to each regular and associate member (in return for dues paid), to each life member (in return for life membership fee paid), to honorary members, to each corresponding society of the Institute, and to such libraries and periodicals as may be determined upon by the Board of Control.

The PROCEEDINGS are published monthly; subscription for non-members, $3.50; enlisted men, U. S. Navy, $3.00. Single copies, by purchase, 30 cents; issues preceding January, 1920, 50 cents.

All letters should be addressed U. S. Naval Institute, Annapolis, Md., and all checks, drafts, and money orders should be made payable to the same.

SPECIAL NOTICE

NAVAL INSTITUTE PRIZE ARTICLE, 1921

A prize of two hundred dollars, with a gold medal, and a life-membership (unless the author is already a life member) in the Institute, is offered by the Naval Institute for the best original article on any subject pertaining to the naval profession published in the PROCEEDINGS during the current year. The prize will be in addition to the author's compensation paid upon publication of the article.

On the opposite page are given suggested topics. Articles are not limited to these topics and no additional weight will be given an article in awarding the prize because it is written on one of these suggested topics over one written on any subject pertaining to the naval profession.

The following rules will govern this competition:

1. All original articles published in the PROCEEDINGS during 1920, which are deemed by the Board of Control to be of sufficient merit, will be passed upon by the Board during the month of January, 1921, and the award for the prize will be made by the Board of Control, voting by ballot.

2. No article received after November 1 will be available for publication in 1920. Articles received subsequent to November 1, if accepted, will be published as soon as practicable thereafter.

3. If, in the opinion of the Board of Control, the best article published during 1920 is not of sufficient merit to be awarded the prize, it may receive "Honorable Mention," or such other distinction as the Board may decide.

4. In case one or more articles receive "Honorable Mention," the writers thereof will receive a minimum prize of seventy-five dollars and a life-membership (unless the author is already a life member) in the Institute, the actual amounts of the awards to be decided by the Board of Control in each case.

5. It is requested that all articles be submitted typewritten and in duplicate; articles submitted written in longhand and in single copy will, however, receive equal consideration.

6. In the event of the prize being awarded to the winner of a previous year, a gold clasp, suitably engraved, will be given in lieu of the gold medal.

By direction of the Board of Control.

S. A. TAFFINDER,
Commander, U. S. N., Secretary and Treasurer.

TOPICS FOR ESSAYS

SUGGESTED BY REQUEST OF THE BOARD OF CONTROL

"Duties and Responsibilities of Subordinates with Special Reference to the Relations between Commanders-in-Chief and Chief of Naval Operations; Commanders-in-Chief and Force Commanders; Force Commanders and Division Commanders."

"Initiative of the Subordinate—Its True Meaning."

"Military Efficiency Dependent upon National Discipline."

"Governmental Organization for War."

"Naval Gunnery, Now and of the Future."

"Naval Policies."

"The Place of the Naval Officer in International Affairs."

"Moral Preparedness."

"Tact in Relation to Discipline."

"The Principles of Naval Administration in Support of War-Time Operations."

"Responsibilities and Duties of Naval and Military Officers of the United States in Educating and Informing the Public on Professional Matters."

"A Commission in The Navy: Its Meaning and the Obligations Which It Involves."

"The Relations of an Officer to his Subordinate, Both Commissioned and Enlisted."

"The True Meaning of the Expression 'An Officer and a Gentleman.'"

"Seen in the Light of Recent Events, What Should Be the United States Navy of the Future as Regards Types and Numbers of Ships."

"Probable Future Development of Surface-craft, Air-craft and Submarines and the Relation of these Types to Each Other and to Naval Warfare in General."

"The Grand Strategy of the Great War, with Especial Reference to Coördination, and Lack of Coördination, Between Naval and Military Forces."

"The Problems of Overseas Operations in the Light of Recent Developments."

"The Influence of Sea Power upon History as Illustrated by the Great War."

LIST OF PRIZE ESSAYS

"WHAT THE NAVY HAS BEEN THINKING ABOUT"

1879

Naval Education. Prize Essay, 1879. By Lieut. Commander A. D. Brown, U. S. N.

NAVAL EDUCATION. First Honorable Mention. By Lieut. Commander C. F. Goodrich, U. S. N.

NAVAL EDUCATION. Second Honorable Mention. By Commander A. T. Mahan, U. S. N.

1880

"The Naval Policy of the United States." Prize Essay, 1880. By Lieutenant Charles Belknap, U. S. N.

1881

The Type of (I) Armored Vessel, (II) Cruiser Best Suited to the Present Needs of the United States. Prize Essay, 1881. By Lieutenant E. W. Very, U. S. N.

SECOND PRIZE ESSAY, 1881. By Lieutenant Seaton Schroeder, U. S. N.

1882

Our Merchant Marine: The Causes of Its Decline and the Means to Be Taken for Its Revival. "Nil clarius aquis." Prize Essay, 1882. By Lieutenant J. D. Kelley, U. S. N.

"MAIS IL FAUT CULTIVER NOTRE JARDIN." Honorable Mention. By Master C. G. Calkins, U. S. N.

"SPERO MELIORA." Honorable Mention. By Lieut. Commander F. E. Chadwick, U. S. N.

"CAUSA LATET: VIS EST NOTISSIMA." Honorable Mention. By Lieutenant R. Wainwright, U. S. N.

1883

How May the Sphere of Usefulness of Naval Officers Be Extended in Time of Peace with Advantage to the Country and the Naval Service? "Pour encourager les Autres." Prize Essay, 1883. By Lieutenant Carlos G. Calkins, U. S. N.

"SEMPER PARATUS." First Honorable Mention. By Commander N. H. Farquhar, U. S. N.

"CULIBET IN ARTE SUA CREDENDUM EST." Second Honorable Mention. By Captain A. P. Cooke, U. S. N.

1884

The Reconstruction and Increase of the Navy. Prize Essay, 1884. By Ensign W. I. Chambers, U. S. N.

1885

Inducements for Retaining Trained Seamen in the Navy, and Best System of Rewards for Long and Faithful Service. Prize Essay, 1885. By Commander N. H. Farquhar, U. S. N.

1886

What Changes in Organization and Drill Are Necessary to Sail and Fight Effectively Our Warships of Latest Type? "Scire quod nescias." Prize Essay, 1886. By Lieutenant Carlos G. Calkins, U. S. N.

THE RESULT OF ALL NAVAL ADMINISTRATION AND EFFORTS FINDS ITS EXPRESSION IN GOOD ORGANIZATION AND THOROUGH DRILL ON BOARD OF SUITABLE SHIPS. Honorable Mention. By Ensign W. L. Rodgers, U. S. N.

1887

The Naval Brigade: Its Organization, Equipment and Tactics. "In hoc signo vinces." Prize Essay, 1887. By Lieutenant C. T. Hutchins.

1888

Torpedoes. Prize Essay, 1888. By Lieut. Commander W. W. Reisinger, U. S. N.

1891

The Enlistment, Training and Organization of Crews for Our Ships of War. Prize Essay, 1891. By Ensign A. P. Niblack, U. S. N.

DISPOSITION AND EMPLOYMENT OF THE FLEET: SHIP AND SQUADRON DRILL. Honorable Mention, 1891. By Lieutenant R. C. Smith, U. S. N.

1892

Torpedo-boats: Their Organization and Conduct. Prize Essay, 1892. By Wm. Laird Clowes.

1894

The U. S. S. Vesuvius, with Special Reference to Her Pneumatic Battery. Prize Essay, 1894. By Lieut. Commander Seaton Schroeder, U. S. N.

NAVAL REFORM. Honorable Mention, 1894. By Passed Assistant Engineer F. M. Bennett, U. S. N.

1895

Tactical Problems in Naval Warfare. Prize Essay, 1895. By Lieut. Commander Richard Wainwright, U. S. N.

A SUMMARY OF THE SITUATION AND OUTLOOK IN EUROPE. An Introduction to the Study of Coming War. Honorable Mention, 1895. By Richmond Pearson Hobson, Assistant Naval Constructor, U. S. N.

SUGGESTIONS FOR INCREASING THE EFFICIENCY OF OUR NEW SHIPS. Honorable Mention, 1895. By Naval Constructor Wm. J. Baxter, U. S. N.

THE BATTLE OF THE YALU. Honorable Mention, 1895. By Ensign Frank Marble, U. S. N.

1896

The Tactics of Ships in the Line of Battle. Prize Essay, 1896. By Lieutenant A. P. Niblack, U. S. N.

THE ORGANIZATION, TRAINING AND DISCIPLINE OF THE NAVY PERSONNEL AS VIEWED FROM THE SHIP. Honorable Mention, 1896. By Lieutenant Wm. F. Fullam, U. S. N.

NAVAL APPRENTICES, INDUCEMENTS, ENLISTING AND TRAINING. The Seaman Branch of the Navy. Honorable Mention, 1896. By Ensign Ryland D. Tisdale, U. S. N.

THE COMPOSITION OF THE FLEET. Honorable Mention 1896. By Lieutenant John M. Ellicott, U. S. N.

1897

Torpedo-boat Policy. Prize Essay, 1897. By Lieutenant R. C. Smith, U. S. N.

A PROPOSED UNIFORM COURSE OF INSTRUCTION FOR THE NAVAL MILITIA. Honorable Mention, 1897. By H. G. Dohrman, Associate Member, U. S. N. I.

TORPEDOES IN EXERCISE AND BATTLE. Honorable Mention, 1897. By Lieutenant J. M. Ellicott, U. S. N.

1898

Esprit de Corps: A Tract for the Times. Prize Essay, 1898. By Captain Caspar Frederick Goodrich, U. S. N.

OUR NAVAL POWER. Honorable Mention, 1898. By Lieut. Commander Richard Wainwright, U. S. N.

TARGET PRACTICE AND THE TRAINING OF GUN CAPTAINS. Honorable Mention, 1898. By Ensign R. H. Jackson, U. S. N.

1900

Torpedo Craft: Types and Employment. Prize Essay, 1900. By Lieutenant R. H. Jackson, U. S. N.

THE AUTOMOBILE TORPEDO AND ITS USES. Honorable Mention, 1900. By Lieutenant L. H. Chandler, U. S. N.

1901

Naval Administration and Organization. Prize Essay, 1901. By Lieutenant John Hood, U. S. N.

1903

Gunnery in Our Navy. The Causes of Its Inferiority and Their Remedies. Prize Essay, 1903. By Professor Philip R. Alger, U. S. N.

A NAVAL TRAINING POLICY AND SYSTEM. Honorable Mention, 1903. By Lieutenant James H. Reid, U. S. N.

SYSTEMATIC TRAINING OF THE ENLISTED PERSONNEL OF THE NAVY. Honorable Mention, 1903. By Lieutenant C. L. Hussey, U. S. N.

OUR TORPEDO-BOAT FLOTILLA. The Training Needed to Insure Its Efficiency. Honorable Mention, 1903. By Lieutenant E. L. Beach, U. S. N.

1904

The Fleet and Its Personnel. Prize Essay, 1904. By Lieutenant S. P. Fullinwider, U. S. N.

A PLEA FOR A HIGHER PHYSICAL, MORAL AND INTELLECTUAL STANDARD OF THE PERSONNEL FOR THE NAVY. Honorable Mention, 1904. By Medical Inspector Howard E. Ames, U. S. N.

1905

American Naval Policy. Prize, Essay 1905. By Commander Bradley A. Fiske, U. S. N.

THE DEPARTMENT OF THE NAVY. Honorable Mention, 1905. By Rear Admiral Stephen B. Luce, U. S. N.

1906

Promotion by Selection. Prize Essay, 1906. By Commander Hawley O. Rittenhouse, U. S. N.

THE ELEMENTS OF FLEET TACTICS. First Honorable Mention, 1906. By Lieut. Commander A. P. Niblack, U. S. N.

GLEANINGS FROM THE SEA OF JAPAN. Second Honorable Mention, 1906. By Captain Seaton Schroeder, U. S. N.

THE PURCHASE SYSTEM OF THE NAVY. Third Honorable Mention, 1906. By Pay Inspector J. A. Mudd, U. S. N.

1907

Storekeeping at the Navy Yards. Prize Essay, 1907. By Pay Inspector John A. Mudd, U. S. N.

BATTLE REHEARSALS. A Few Thoughts on Our Next Step in Fleet-Gunnery. First Honorable Mention, 1907. By Lieut. Commander Yates Stirling, U. S. N.

THE NAVAL PROFESSION. Second Honorable Mention, 1907. By Commander Bradley A. Fiske, U. S. N.

1908

A Few Hints to the Study of Naval Tactics. Prize Essay, 1908. By Lieutenant W. S. Pye, U. S. N.

THE MONEY FOR THE NAVY. First Honorable Mention, 1908. By Pay Inspector John A. Mudd, U. S. N.

THE NATION'S DEFENCE—THE OFFENSIVE FLEET. How Shall We Prepare It for Battle? Second Honorable Mention, 1908. By Lieut. Commander Yates Stirling, U. S. N.

1909

Some Ideas about Organization on Board Ship. Prize Essay, 1909. By Lieutenant Ernest J. King, U. S. N.

THE NAVY AND COAST DEFENCE. Honorable Mention, 1909. By Commodore W. H. Beehler, U. S. N.

THE REORGANIZATION OF THE NAVAL ESTABLISHMENT. Honorable Mention, 1909. By Pay Inspector J. A. Mudd, U. S. N.

A PLEA FOR PHYSICAL TRAINING IN THE NAVY. Honorable Mention, 1909. By Commander A. P. Niblack, U. S. N.

1910

The Merchant Marine and the Navy. Prize Essay, 1910. By Naval Constructor T. G. Roberts, U. S. N.

THE NAVAL STRATEGY OF THE RUSSO-JAPANESE WAR. Honorable Mention, 1910. By Lieutenant Lyman A. Cotton, U. S. N.

1911

Navy Yard Economy. Prize Essay, 1911. By Paymaster Charles Conard, U. S. N.

NAVAL POWER. Honorable Mention, 1911. By Captain Bradley A. Fiske, U. S. N.

WANTED—FIRST AID. Honorable Mention, 1911. By Commander C. C. Marsh, U. S. N.

1912

Naval Might. Prize Essay, 1912. By Lieutenant Ridgely Hunt, U. S. N. (retired).

INSPECTION DUTY AT THE NAVY YARDS. Honorable Mention, 1912. By Lieut. Commander T. D. Parker, U. S. N.

1913

The Greatest Need of the Atlantic Fleet. Prize Essay, 1913. By Lieut. Commander Harry E. Yarnell, U. S. N.

NAVY DEPARTMENT ORGANIZATION. A Study of Principles. First Honorable Mention, 1913. By Commander Yates Stirling, Jr., U. S. N.

TRAINED INITIATIVE AND UNITY OF ACTION. Second Honorable Mention, 1913. By Lieut. Commander Dudley W. Knox, U. S. N.

1914

The Great Lesson from Nelson for To-day. Prize Essay, 1914. By Lieut. Commander Dudley W. Knox, U. S. N.

NAVAL POLICY AS IT RELATES TO THE SHORE ESTABLISHMENT AND THE MAINTENANCE OF THE FLEET. Honorable Mention, 1914. By Captain John Hood, U. S. N.

OLD PRINCIPLES AND MODERN APPLICATIONS. Honorable Mention, 1914. By Lieut. Commander Dudley W. Knox, U. S. N.

MILITARY PREPAREDNESS. Honorable Mention, 1914. By Naval Constructor Richard D. Gatewood, U. S. N.

1915

The Rôle of Doctrine in Naval Warfare. Prize Essay, 1915. By Lieut. Commander Dudley W. Knox, U. S. N.

AN AIR FLEET: OUR PRESSING NAVAL WANT. First Honorable Mention, 1915. By Lieut. Commander Thomas Drayton Parker, U. S. N.

TACTICS. Second Honorable Mention, 1915. By Ensign H. H. Frost, U. S. N.

DEFENCE AGAINST SURPRISE TORPEDO ATTACK. Third Honorable Mention, 1915. By Ensign R. T. Merrill, 2d, U. S. N.

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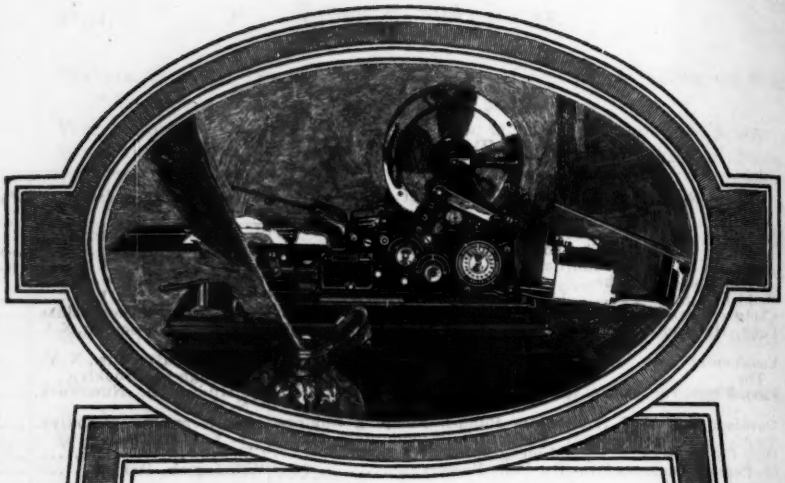

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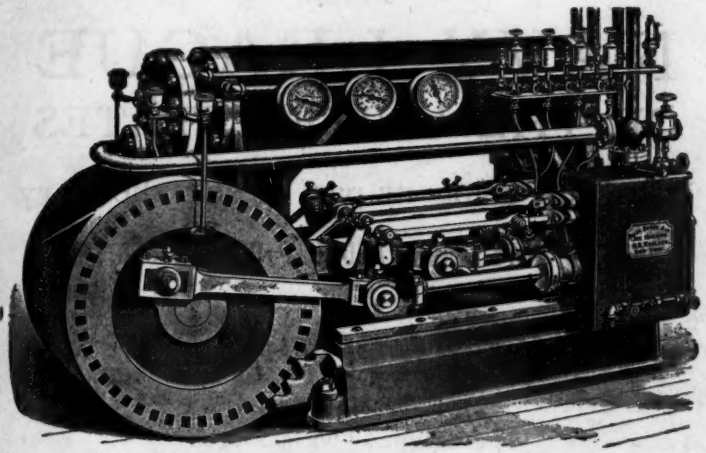

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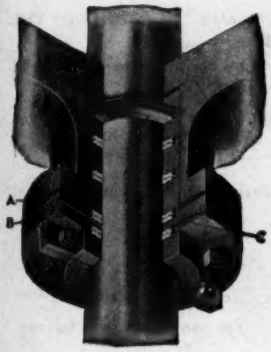

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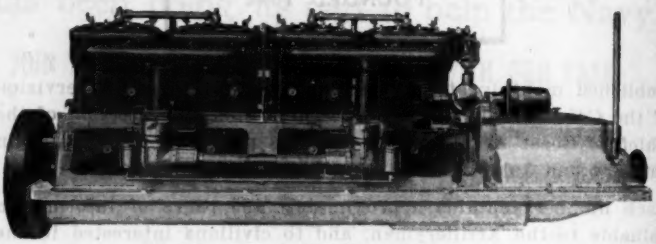

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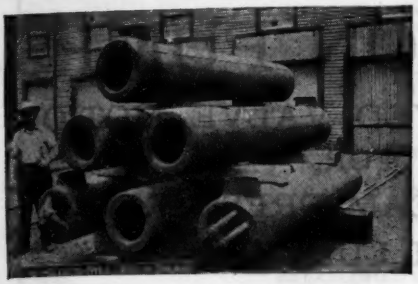

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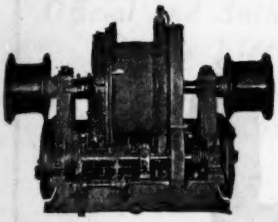

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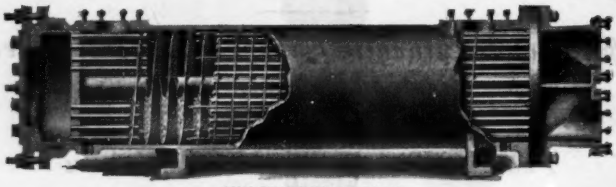

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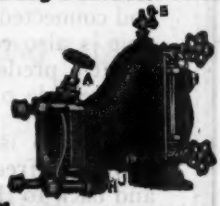

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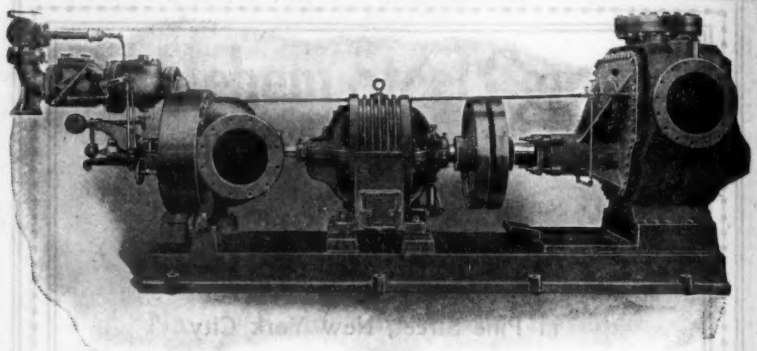

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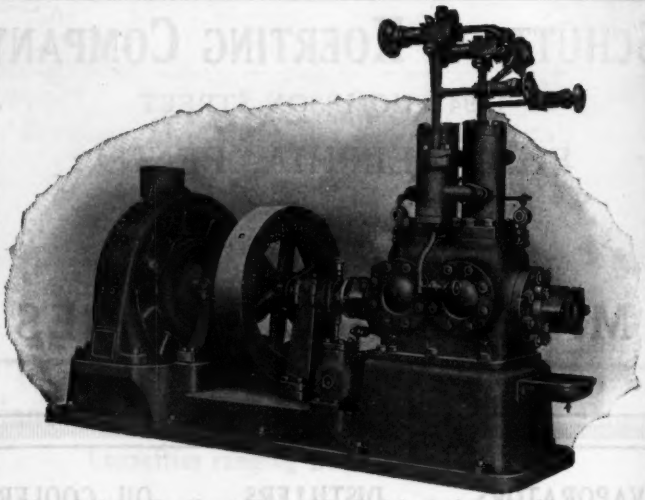

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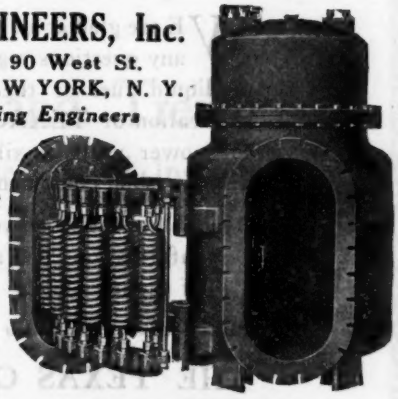

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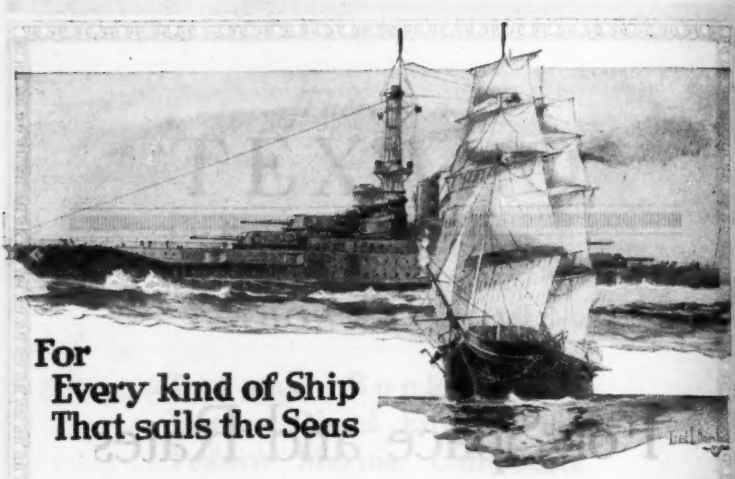

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